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SOME DISORDERS OF SLEEP.[1]

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When dealing with organs or functions the physiology of which we, in a measure at least, comprehend, it becomes easy and pleasant to discuss their alterations from health; but as regards sleep we know little. The wildest theories have been entertained concerning it; and, after all, we are simply driven to believe that it is a state of the nerve-cells—and why not of the nerves?—in which they become functionally actionless in a variable degree. Whether this be true also of the other cell structures of the body we do not know; and sleep may be a universal function, as would seem reasonable to those who believe that plants sleep. It is sure, also, that the sleeping brain contains less blood, or it circulates less, than the brain awake, and this is the limit of what we know.

The disorders of sleep are many. I have found myself driven to choose among them, and I shall limit myself to a less known group to some members of which I was the first to call attention.

In 1876[2] I described several of the morbid states of sleep, and again wrote of them more freely in 1878.[3] In 1882, in my lectures on "Nervous Disorders of Women," I dwelt at greater length on the symptoms in question, as well as on others which have been much discussed of late in the journals without notable additions of value.

In making choice of how I shall treat of sleep troubles I have been influenced somewhat by the fact that certain of these it has been my

[1] Read before the Association of American Physicians, May, 1890.

[2] Philadelphia Medical Reporter, 1876.

[3] Virginia Medical Journal, 1878.

fortune to see and to study more than I have the better known phenomena of dreams, somnambulism, and the like.

The approach to the unconsciousness of slumber, and, too, the return from it to the world of volition, may be medically considered as part of sleep, and, as I shall show, these periods are often disturbed by certain very interesting symptoms.

As we are falling asleep the senses fall from guard in orderly and well-known succession—this interval I desire to label the *præ-dormitium*. When we begin to awaken, and the drowsied sentinels again resume their posts, there is a changeful time, during which the mind gradually regains possession of its powers—this interval I may call, in like fashion, the *post-dormitium*.

The Relation of the Præ-dormitium to Insanity.—In the borderland of coming slumber, when we are not yet overwhelmed by its full power, the steadying contradictions of the external world are, in a measure, by degrees cut off, whilst the will still holds a slowly lessening rule. It has long been known to alienists that the præ-dormitium is apt to be invaded by hallucinations in those who are apt to become disturbed in mind. Every student of himself knows, too, what a fairy country for visions is this intermediate state. Since, in the well, it is the time for castle-building, it seems natural that, in the disordered, it should serve to foster dangerous hallucinations, and that, in rare instances, these should be limited to the period in question. Baillarger is the only author who has studied with any care the relation of the præ-dormitium to insanity. Of this he says:

"The organs of sense ceasing to transmit to us exterior impressions, the control of our ideas escapes us, and whatever rises appears, as it were, spontaneous; at times vague or confused fantastic forms succeed one another, and we have of it all but a half consciousness. At times more distinct forms appear, and we are present, as it were, at a strange spectacle in which we take no active share, but which leaves distinct traces on the mind. Any exterior intervening impression causes these visions to vanish. A sudden noise, or touch, or light awakens fully the senses, recalls attention, and these phantoms are effaced."[1]

In a long series of interesting cases he shows that certain persons, otherwise still sound, are liable to have, between waking and sleep, hallucinations which long precede the outbreak of insanity. He describes instances of such hallucinations of sight and hearing as lasting from one to three years, and ending in grave mental disease. These were usually voices or visions fading when the eyes were opened. In one case there was something like the sense of a blow on the head, and then on the bed, but nothing comparable in this direction to the phenomena of sensory shocks to which I shall presently call your attention.

I have myself seen illustrations of the facts mentioned, and I speak

[1] Baillarger: Annales Méd. Psych., vols. v. and vi.

of them here because this is ground we rarely go over in our examinations of patients. It will possibly be found that valuable prognostic indications as to insanity may be gained by examination of the prædormitium.

Before passing on to other matters I may say that generally, as I have known them, these prodromes of insanity were connected with eye or ear alone. In but one case was olfaction concerned. I will content myself with a sketch of it:

CASE I.—Mrs. C., æt. forty, of a neurotic family, all liable to neuralgic headaches. One brother died of ataxia. Convulsions in infancy were common to all five brothers and sisters—none ending in epilepsy. Mrs. C., otherwise than as to headaches, well, had a fall which injured her nose. The shock resulted in persistent headache, without other cerebral trouble save complete loss of smell. Two years later she had, but only on going to sleep, a sense of horrible odors, which were fæcal or animal, and most intense. This lasted several months, and then were added sounds of voices, which were at first vague, but at last accusative and soon were heard in the day. The case ended in melancholia, with delirium of persecution, during which the trouble as to smell passed away.

CASE II.—A. C., a clever lad, of exceptionably able and normal descent, became insane at eleven years of age, and was long maniacal and often homicidal. For some months before this outbreak—which was acute—he was troubled by seeing animals on his bed before he fell asleep. Opening his eyes routed them at once. The condition seemed to have none of the peculiarities of the night terrors of childhood.

I am tempted to add the brief notes of another lad's case, in which the same præ-somnic period was a time of singular disorder of mind. It is, of course, known to many of you that the bromides may in some persons (and notably in the young) occasion, like mercaptan, profound melancholy or maniacal tendencies, which in several instances in my experience have been homicidal, or at least madly destructive.

The lad in question, an epileptic, was said to become homicidal from bromides. I was sceptical enough to test the matter. About the seventh day of using full doses of lithium bromide the trouble showed itself n the præ-somnic time, as visions of himself killing other children. It annoyed him greatly, so that he strove to keep awake, but at last, tired of the unnatural effort, would fall asleep, with too brief an interval to allow of his being disturbed again. After several nights of like distress the homicidal tendency broke out in abrupt and dangerous violence during the daytime.

There are epileptic cases in which inhibition of fits causes homicidal explosions which cease when the fit comes on, and do not recur for a time, whether bromides are continuously used or not. In the lad's case the fits did not lessen the tendencies to destroy or injure others. These lasted as long as the bromides were given. I think Echeverria mentions like cases.

There exists also, I may say, a group of cases (not in the books) in which the borderland of sleep is haunted by hallucinations for weeks or years without their ending of necessity in mental disease. But it is quite impossible for me here at this time to dwell on these interesting cases, of which I have seen a few, and but a few. In no respect do they differ from the like cases reported by Baillarger in which insanity resulted, save in the fact that it did not. Voices were heard, or distressingly real visions seen during the præ-dormitium and at no other period. With time and due care these visions faded away. Two of the half-dozen I recall were hysterical women; two were men in busy affairs, and one, the worst, a woman of thirty-seven, was, I think, preserved from insanity by the loss of her ovaries.

The corresponding time, which comes after sleep and before full wakefulness, is also said by Baillarger to be troubled in some by hallucinations; but of this I have no experience, nor does he speak of it as common. Tuke also has reported cases.

There is yet another and stranger mental condition experienced, though rarely, in the præ-dormitium. This is a suddenly acquired and sometimes persistent sensation of fear or terror without any sensory hallucination. For our emotional states we have usually a cause, or at least think we have, but what I now describe is an emotion without known parentage. Children may exhibit this continuous fear some time after the scare of a dream, like the echo of an emotion the cause of which is over.

Sometimes in adults this lasting sense of alarm is the product of a dream. The victim awakens and continues even for hours to feel the fear to which his dream gave rise. He is wide awake; lights the lamp; reads, or tries to; but is still fear-haunted, reason as he may. The patient who is liable to this fear may also be subject to attacks of pure fear without a dream cause, and arising in the time between waking and slumber. He has then no dream. Of a sudden, whilst half awake, the man is afraid. It is pure fear, such as the insane have at times. I append a case from my first paper. In it were both forms of the trouble here mentioned. The case is given, as stated by the sufferer, a scholarly, much overworked man, with no obvious habits, hereditations, or disorders to explain his condition. He says:

"About the year 1871 I was troubled with what I understand to be 'night-terrors,' but unlike any I have been able to hear of. Upon retiring I could generally tell whether or not I should have this trouble during the night. These premonitions were: A difficulty in breathing, not being able to draw a full breath, owing, as to me it seemed, to some obstruction in the lungs; intense nervousness; turning from side to side.

"I would fall asleep and have vivid dreams, and almost always upon the same subject, the purport of which was, that after long absence from home I returned and found that some one dear to me had become idiotic.

"The most painful attack of this kind occurred in 1872. That night I

dreamed that after a long absence I returned, and, upon approaching the city, I saw upon a steamboat my aunt. She had become crazy in my absence and was under the charge of keepers. As I neared the boat to speak to her she leaped overboard and was drowned, and her body, with a fearful idiotic leer upon her face, floated past me so close that I could touch it. I awoke with a sudden start, trembling from head to foot; and, although in a moment I realized that it was but a dream, yet the feeling of terror, instead of leaving me, rather increased. I was obliged to rise, light the gas, and leave the room and remain for several hours in an adjoining one. I then returned to bed and slept until morning; but the next evening, when it came time to retire, the recollections of the past night were so vivid, and the intensity of the mental suffering so clearly before my mind, that I could not force myself to retire. My reason told me that this was a foolish feeling, and that I ought to conquer it. But after a severe struggle reason gave place to this undefinable feeling of terror. That night, and for several nights afterward, although I was not addicted to drinking, I drank strong liquor until my senses were clouded, and this I did intentionally, otherwise I could not have retired.

"During the day-time, when thinking over this fearful attack, I concluded if it were given me the choice between passing one such night and being deaf, blind, or lame for life, I should choose the latter; nay, I felt that even death itself would be preferable to such another night. I have never since experienced such intense suffering, but have passed through it many times in lighter forms.

"This fall (1875) it took a different turn. Upon retiring I was unable to keep my eyes closed, because the moment I closed them a feeling akin to fright would cause me to open them.

"This was like, but incomparably less than, the dream-evolved terror. Nevertheless, it was bad enough. It did not come if sitting up I closed my eyes, but to lie down and close them was often enough; or, if the emotion did not then arise, it seemed to burst upon me just as I was conscious that sleep was near. These attacks were the worst. I was afraid—and of nothing. No reasoning helped me. As I am by nature, despite my professional life, hardy and courageous, I was rather ashamed of being fearful of nothing, knowing that in battle I had had no more fear than others, and none that disturbed me.

"After tossing endlessly for hours, I would at last sleep for an hour or more with the sense of sleeping illy. If I had a bad bout, I sometimes awakened with my mind not clear, and feeling as if I needed effort to steady it."

Despite these alarming symptoms, this gentleman got well after a summer in camp in Maine.

Others have described to me this state of fear in the præ-somnic condition. Says one:

"I have had, like others, nightmare, but this comes over me while I am quite conscious, and, of this I am sure, whilst yet capable of mental analysis, and just pleasantly drowsing. I simply and abruptly realize that I am afraid. I feel it coming. I am not paralyzed, as by nightmares. I can move. If I fully sit up, it is over; but, if I delay to do so, and it catches me, it stays on for a minute or two after I am completely awake and master of myself. I sometimes lie still with open eyes and seek to know why I fear, or reason it over, but nothing relieves me. The fear goes by degrees, but if at once I lie down again and close my eyes it comes back."

Another mental state, somewhat akin to this last (for fear and anxiety are near akin), also occupies the præ-dormitium. It is always an associate of bad sleep, or of insomnia, and consists in a series of unreasonable fears and anxieties. I will let a sufferer tell his story as he wrote it for me.

He was fifty years old, of nervous, restless intelligence, anxious always, successful past the common, free from disease, endowed with a perfect stomach, and habitually insomnic. He called three hours a good sleep, and for years lived on this and an afternoon nap of an hour. Now and then, his restlessness got worse, and was the insomnia of over-vigilant and excited centres, which furnished a succession of anxieties, each in turn capable of inhibiting sleep. He says:

"This trouble haunts the time close to sleep. I lie down; am easy, and assured of sleep. Suddenly, I think, Is the gas turned off properly? I get up and look; return to bed; get up again, and so on. At last, I become anxious as to my son, aged six. Is he safe in bed? will he fall out? My wife goes to see, reassures me, and then I go myself, and go a dozen times. Next, it is the furnace, or the locks, or fear of fire, until, worn out, I am surprised by sleep. It seems as if this thing waits for me at the gates of sleep, and I can understand that just then one's fancies may run wild. But once awake, the thing goes on until I am ashamed of the demands made upon my wife, and, too, of my own folly. I know of others who have the same trouble, but never in the day season."

Sleep-numbness. Nocturnal Paresis or Paralysis.—As sleep-numbness, this disorder has become familiar since I described it in February, 1876, and later more fully in my book in 1882. Since then, Dr Andrew H. Smith, in this country, and Dr. Saundby, in England, have written of it anew; the former as an undescribed neurosis, and the latter without full knowledge of what had already been written. Dr. Saundby thinks I appear to have recognized this condition, but is of the opinion that the name I gave—nocturnal hemiplegia—in view of the very temporary loss of power, is not very appropriate. In fact, I described pronounced cases chiefly, and their duration had nothing to do with the nomenclature.

In general, functional day-numbness (as I and others have described it), whether neurotic, anæmic, gouty, diabetic, atonic, or asthenic, is apt enough to repeat itself at night in sleep. But there are people who never have day-numbness, and who are, nevertheless, liable to awaken with this interesting neurosis.

Definitions of it do not admit of sharp boundaries. It may be local, transient, a slight numb feeling, a faint tingling of the fingers, of a leg, or of one side; or else it may be intense, and present us with paresis and real defects of the touch- and pain-sense. In another case it may show itself as an alarming monoplegia, or distinct hemiplegia, lasting a few moments, or growing worse during hours. Again, it may involve the whole body, but is then apt to be less severe than are the hemi- or monoplegic forms. Yet, are they all akin? I have seen several of them in one person; at this time slight numbness, and at that, hemiplegia, alarmingly positive, with marked loss of power and with lessened sensibility. For Dr. Andrew A. Smith, waking-numbness is a paræsthesia at the exit from sleep, and "in this," he says, "there is nothing

added, and nothing taken away." But these subjective states, which to-day are mere tingling or formication, may to-morrow deepen into the semblance of hemiplegia, with distinct loss of sensation. It is only a question of degree. The neurasthenic, the hysterical, the tobacco-poisoned, the gouty, the dyspeptic, are liable to awaken with numbness, tingling, dysæsthesia of a part, or of both hands, or of a side. It goes off in a few minutes. More rarely, there is distinct weakness of an arm or a side, with dysæsthesia, very rarely with complete loss of feeling. In every case where there is lessened or lost motility, the sense of touch is also interfered with. And so it is that we may have various degrees of disturbance from faint tingling to profound temporary dysæsthesia and defects of power from paresis up to a brief simulation of paralysis. Were the worst of these simulations to last, they would be grave enough, and, in fact, it does sometimes happen that such states as I describe may even deepen in intensity after the patient is fully awake. In some patients they recur night after night, attack both hands or both sides on successive nights, or occur at intervals for years. I may add that I have sometimes seen this symptom in men apparently vigorous, and that it also occurs, now and then, in those who have multiple cerebral aneurisms or endarteritis. I have seen it, too, over and over, in convalescent hemiplegics. They awaken with the palsy worse, a functional condition being for a time added to that which had an organic cause, or the sound side suffers, to their great alarm.

I give a physician's story of his attack:

"Excessive work, with double abuse of tobacco, had caused day-numbness, which troubled the ulnar territories most. One morning I awakened with transient numbness of the whole left hand with no true loss of touch. A week later, I had on awakening dysæsthesia, with pricking of the whole right side, including face and tongue. I arose, found leg and arm weak, examined sensation in the finger-tips and recognized the fact that with scissor-points applied to the finger-cushions, I could not be sure of them as two at one-third of an inch separation. I was about to send for a physician, when the sense of tingling becoming worse in the extremities, the dysæsthesia grew less, and in two hours I was as well as ever."

It is of interest that he soon after saw a case of waking-numbness in a tobacco-using patient, whom he confidently reassured, stating his own case. In fact, however, the patient owed his numbness to unrecognized diabetes, and it ended in gangrene.

The history of numbness in all its grades points to a central origin, but that it may arise otherwise is also clear. In some cases of neuritis I have seen night-numbness as a first, a transient, and a repeated symptom preceding the pain by several days.

Some years ago, whilst writing my book on *Nerve Lesions*, I froze my right ulnar nerve with alcohol at 0° F. For ten days afterward I had more or less discomfort, and even acute pain, but especially, several

times, a positive numbness of the ulnar territory with which I awakened. It passed off with friction in an hour, but was much worse than the occasional day-numbness, which my experiment created. Yet, for a time, it was purely a waking symptom and faded swiftly. The more profound examples of hemi-anæsthesia with paresis as post-somnic states are, I think, most apt to involve the right hemisphere. I recall no instance of aphasic accompaniments in the rarer left brain disturbances. In their varieties these symptoms probably represent functional irritations or inhibitions of quite various parts of the brain; unlike their hysteric related states, they are felt in the face as well as below it, and are clinically of kin to the functional anæsthesias and pareses of certain migraines.

In some cases, notably in hysteria, waking-numbness is associated with pain in the parts affected, or there are also paræsthetic expressions, as sense of constriction, elongation, etc. At times, the sensation resembles the furious formication of aconite-poisoning.

In Dr. Ormerod's paper[1] on numbness (which is the best of the English essays) he speaks of the pain suffered by some of his cases, and as to this he is quite correct. In fact, there are those who awake with pain in arm or leg, or both, so intense as to make the accompanying numbness seem of little moment. Pain as an accompaniment is also mentioned by Sinkler, but not as being severe; whereas, it is in some instances of waking-numbness very great. I add two or three cases. The first, again that of a physician, I leave as he wrote it. He says:

"The preparative causes of my present state were excess in tobacco, and a practice which left me no rest. Then came a domestic calamity, and I broke down with distress in the occiput, and an amount of suddenly developed physical feebleness which annoyed me. I could not walk up three flights of stairs without resting. My heart became rapid—90 to 100; my temperature 97.4°, and at night 98°. I was struck, too, with the weakness of my bladder, the urine merely falling as it emerged. All this was in December. In February I began to have night-numbness, and would wake in the night with all four limbs numb. The worst attacks were those at waking in the morning late. Early in the night the symptoms were less notable, or else affected one limb only, or one side. At times it was mere tingling; at others, positive lessening of sensibility to touch and pain. When this was the case, the limbs were for a time paretic; on one occasion so much so that I fell on getting out of bed. The trouble has not lasted usually more than thirty minutes, but went with great tingling, as of a limb asleep, as is said. After March, I began at times to have numbness in daytime, but rarely so intense as to disturb feeling. The tingling occasionally affected my whole surface, and was apt to begin around the mouth."

In this case the spmptoms were neurasthenic, and absolutely no other cause could be assigned for it. Recovery was complete. The next cases are from Dr. Féré,[1] and are certainly hysterical and of great interest.

[1] St. Barthlomew's Hospital Reports, 1883.

[1] Brain, October, 1889.

"*Nocturnal Paralysis.*—Mrs. V. came to consult me, for the first time, at the Saltpêtrière on the 12th of January, 1885. She was accompanied by her mother, who was over sixty years of age, but still very agile, and looked much younger than she really was. The mother had a painful ovarian spot with slight anæsthesia on the left side. Although the menses had ceased nine years previously, she had been subject to migraine, with attacks of melancholia, and occasionally convulsive fits. The father, who had been a drunkard and profligate, had quitted the house twenty years before, and no one knew what had become of him. A brother of the father had died in prison while undergoing confinement for swindling. Mrs. V. had two sisters born after her. The one had died of convulsions connected with teething at the age of eighteen months; the other died of convulsions when only six months old.

"Mrs. V. had been a precocious child both physically and mentally. She had walked and spoken at a very early age, and had learned very rapidly at school. She has never had convulsions nor tic, but from the age of six has suffered from frequent migraine, followed by vomiting, and during her whole life her sleep has been troubled by nocturnal terrors and nightmare. Menses began when she was twelve. At the age of seventeen she had attacks of chorea in consequence of worry. This lasted three months, and chiefly affected the left side. At nineteen she was married, and had her first child, a boy, when twenty-three. This child died of convulsions on the eighth day. In the following year she was delivered of a child stillborn. During her pregnancy she had anorexia and vomiting, which ceased spontaneously in the fourth month.

"Since her chorea Mrs. V. has always enjoyed good health, and has had no distinctive nervous outbreaks until about three years ago. At the time her husband died she suffered severe pecuniary loss. This induced insomnia, followed by loss of appetite and emaciation. By hard work her health became pretty good. About two months ago she had a very abundant metrorrhage. A few days after this mishap she began to feel constrictive pains in the head, extending over the whole of the cranium, but predominating in the postero-inferior region, which appeared, moreover, to be the seat of a constant pressure. From time to time she heard a cracking noise in the back part of the neck, which resounded in the occipital region of the skull. At nightfall she was seized by painful fancies, of ruin for her mother and her daughter, of illness for all her friends; at the same time she was a prey to unusual pusillanimity and indecision. Her sleep was disturbed by dreadful nightmares. She was widely awake toward six in the morning, but was incapable of making any movement. She suffered from distention of the bladder, but could not even think of getting up. Her limbs seemed numb to her, and as if wrapped in cotton. She appeared to know the position of her extremities only, and it seemed to her as if the greater part of each limb was wanting, and her hands and feet had been brought up close to her body. The sensation is analogous to that experienced by amputated persons, who say they feel only the extremity of the absent limb. She could make no movement whatever. When daylight was admitted a sensation of numbness and pricking gradually appeared in the extremities of the fingers and toes. These sensations, occasionally very painful, preceded the return of ability to move. About eight o'clock the patient could get out of bed, maintain herself in a standing position, and make movements of the arms. The complicated movements of the fingers, however, remained almost impossible. She was thus incapable of fastening her clothes, or of taking up a pin. When she had moved her arms and had been rubbed a little, her fingers became more supple. From the time she awoke until the nearly complete restoration of movement took in general about three hours. One day, when left in a dark room until about ten o'clock, she was found in the same helpless condition. Movements of the head and neck and of articulation were not affected. On examination no modification of the external aspect of the limbs could be determined. She suffered pain in the region of the left ovary, and had slight anæsthesia on the

same side. The contraction of the field of vision was tolerably extensive, and the patient was insensible to violet rays in the left eye. The iris of the left eye is of a deeper brown, and the pupil not so large as on the other side. Under the influence of bitters, iron, bromide of potassium and hydrotherapy combined with static electricity, all these symptoms disappeared in the space of three weeks, with the exception of pain over the ovary and the hemi-anæsthesia."

Case of Mrs. P. She complained of sudden shocks in the head which awoke her abruptly. These occurred by night four or five times. Finally came other troubles which raised her inquietude to a climax. When her sleep became broken, toward four or five o'clock in the morning, she found that she could not move any of her limbs. This general helplessness did not last very long, for after a few minutes of effort she recovered power of movement in her right hand and foot, but for the limbs on the left side prolonged friction was necessary. This paresis was accompanied chiefly on the left side by a sensation of painful numbness and pricking. The hand especially was quite cold, and the fingers appeared to diminish in volume, the rings hanging quite loosely.

This helplessness, which at first persisted only a few minutes, was in a month's time prolonged for an hour or more. The patient could not raise herself out of bed until some one had opened the windows widely and rubbed her energetically. Even then she would remain for many hours incapable of making any delicate movements or even of simply fastening her dress. When the paralysis was at its maximum the patient declared that she was no longer conscious of the existence of her own body, that she was, to use her own words, a *pur esprit*.

Under the influence of cold douches repeated twice a day at regular hours and a tonic treatment of iron, nux vomica, and arsenic, with bromide of potassium given every evening in moderate doses—one to three grammes—her condition rapidly improved. The paralytic numbness on waking diminished at once in duration and then in intensity. At the end of fifteen days it had almost completely vanished. The sensations of shocks in the head, which had caused the patient to awake, disappeared in turn. The anorexia and pains resisted longer; at the end of six weeks the pain in the tendo-Achillis still persisted, but in time it too disappeared.

It is very clear that a vast range of disease or disorder seems capable of causing night-palsy in its variety of degree. As concerns the cause, there is difference of opinion, from those who look upon it as due to rare somnic phases of the vessels of the brain to those who see in it, like Féré,[1] a deficiency of physiological excitation—"paralysis from irritation." Reflex it surely is at times, and local or peripheral rarely.

As to treatment, it is folly to discuss it. It means anything from the treatment of neurosis to that of gout, renal insufficiency, diabetes, and what not.

Sleep-ptosis.—Another form of annoyance to which I have time to give but a passing notice is the ptosis of sleep. Of this I nowhere find mention. The patient wakens with palsied lids; lifted, they fall again. In some instances it lasts a few minutes or longer, or else before the disorder repairs itself sleep returns, and at morning the patient has it anew, or awakens without it.

I append two cases which came under the care of Dr. de Schweinitz

[1] Brain, October, 1889.

One was that of a woman, aged sixty-five years, as I understand in good health and not hysterical. There was some irritation of the lids and slight general conjunctivitis, also there was a slowly ripening double cataract. As the vision was still fairly good she read much, and if she used her eyes freely in the evening was sure to experience the following trouble: waking in the night, she found that her eyes could not be opened by the will. After they were forcibly opened they remained controllable by volition until after sleeping again, when the same phenomena recurred.

The notes are not complete, and although she describes the ptosis as spastic, it seems to me to have been only a night-palsy, of temporary duration. A somewhat similar case was observed at my clinic a few weeks ago, and I have seen a number of them:

J. C., aged twenty-nine years, a widow, was in absolute health after a childless marriage of four years. Soon after her husband's death she began to suffer with sexual dreams, and later, with these and hemi-anæsthesia of decisive type without loss of power. A year from the beginning of her widowhood she awakened thrice in one night with paralysis of the lids. There were no eye troubles, but the lids as she awakened could not be lifted at will. When raised by a finger they fell flaccid, and only by degrees, in an hour, recovered tone. This trouble, unknown to the day, continued for many months, and, indeed, disappeared only when this and all the other symptoms were promptly dispersed by a second marriage.

In another case the ptosis was like the emotional spastic ptosis of hysteria we see in waking hours, and well known to neurologists:

A woman, aged sixty-seven years, in good general health, but full of notions; for fourteen years has been the subject of stubborn retinal asthenopia; the eye-grounds are, however, healthy; there is a considerable degree of hypermetropia and astigmatism, together with insufficiency of the internal straight muscles. Each night, for a long time, usually between twelve and two, she has been awakened over and over by a feeling that her eyes have closed spasmodically. She arises, forces them open with difficulty, and bathes them, "because the lids feel as if they were sticky and would glue fast." The phenomena repeat themselves, but never by day.

This case proved, I believe, very obstinate, and is only notable because it is of nocturnal origin alone.

Sleep Pain.—I add a few words as to what is, for rarity, a medical curiosity. I find on my note-book some half-dozen cases of pain in the legs, never known to the day, and needing sleep as a conditioning factor. Whenever I have spoken to a patient of this obscure disorder he is apt, if intelligent, to say: "No, not pain; it is distress." It occurs in middle life, or later, and, without previous disease, comes on slowly. In one case it followed a typhoid fever. The cases are alike. A man is well in the day; walks, works, does as do others. Some time after he falls asleep he is awakened by aching in the legs, from the sole half-way to the knees. There is but one remedy—motion. He rises, walks for ten

minutes, is eased, goes to sleep, and in an hour or two awakens to feel the distress and repeat the relieving exercise. There is no unusual heat or cold; nor any abnormal appearance. The matter is unpleasantly simple, and there is no clue to a cause.

The case I now quote from my note-book I saw two years ago. It is typical of a rare condition:

J. C., aged fifty-eight years, farmer, Kentucky; married; two healthy children; himself of sound breed. Has worked hard, and has never known a serious illness. No malaria. In October, 1886, consulted me; I found him a man weighing 180 pounds; height six feet, vigorous, with soft arteries; heart beating seventy-six, and perfect. He has no piles, hernia, or varicose veins. Eats well; is in all ways moderate and regular; does not smoke, and does not chew tobacco. All the reflexes are normal; the heart and arterial tension healthy. No organ is diseased; can work all day; no tenderness in nerve tracts.

About four years ago he began to wake now and then with distress in the legs. During the next year this got worse, and now is a source of extreme suffering and of disability, because of the loss of sleep it causes. Within an hour after bedtime he awakens in what he calls torment. From the knee to the toe his legs ache, without throb or sharp pain. He rises, walks until weary, goes to bed, sleeps, and wakes to the same pain or distress. Again walks, and so on, until day brings relief.

At the infirmary we learned that in the attacks the legs remain normal as to temperature, reflexes, and electrical conditions, as well as to sensation. No remedies were of the least use, except morphine, and I advised its steady use in despair as to other means.

Sensory Shocks.—Another phenomenon of sleep, or its borders, and also in the sensory sphere, I first described as sensory shocks or discharges.[1] This is a more rare, but also a more interesting disorder, than numbness. Except my own paper and a small book by a homœopathic practitioner,[2] I know of no literature on the subject beyond a few lines of remark on my paper in an essay of Hughlings Jackson's. Nevertheless, the subject is still of interest.

All the disturbing phenomena of sleep at some time represent themselves, more or less well, in our waking hours. But sensory shocks are, of all disorders of sleep, the most rare in daytime.

In the præ-somnic state of fading sensation, but never on waking from sleep, the patient has in his head a sudden and violent sensation, and the forms it assumes may be classified thus:

I. *In the sphere of general sensation.*—He feels as if struck, or as if he had a shock like that which a sudden arrest of motion causes; or, it is

[1] Virginia Medical Journal, op. cit. Lectures on Nervous Diseases, op. cit.

[2] In Dr. W. S. Searle's book he described sleep shocks as a neurosis, hitherto unmentioned in medicine, and was evidently unaware that I had already and fully delineated its peculiarities.

a feeling of rending, or a bolt driven through the head. These are the most common.

II. *Auditory.*—A loud noise, like that of a pistol-shot, or of the crash of broken glass, or as of a bell, or a wire sharply twanged.

III. *Visual.*—A flash of light.

IV. *Olfactory.*—Sudden sense of an odor.

V. I doubtfully add what I call *emotional discharges.* These are always mere abrupt sense of fear, sometimes *preceding* the sensory shock, and sometimes *following.*

What happens is usually this: A man going to sleep, but still quite conscious, and able to observe, feels suddenly a shock in the head. It seems mechanical, as of a blow, or noise, or else of both; and, also, there may be added a flash of light, vivid or like the soft summer lightning along an evening horizon. The intensity of these phenomena may be appalling, and even those who are used to them greatly dread their return. The first experience is sometimes most alarming.

In many cases there is an aura. A physician, who came to me on account of these attacks, first called my attention to this. While waiting for sleep he became aware of an indescribable something, which rose from the feet and hands, and taking eight or ten seconds to reach the head, there ended in a sound like the crash of glass houses breaking in a hail-storm, with a vivid flash of yellow light, leaving him for a moment dazed, but able at once to rise, or to think. Such is the usual account given of this aura. It never varies, save that it may rise only from the belly.

All sufferers, or nearly all, who have aura, say they can stop the attack by turning over, or sitting up, or even by opening the eyes. A friend, who had this trouble owing to tobacco, says:

"The shocks were of two kinds; one as if I received in the brain a thump, and one as if a pistol-shot occurred *in* the head. I had for a long while no idea that the pleasant mistress, Nicotia, was disturbing my internal economy. At last, before learning this, I got used to these abnormal things, and would lie still and feel what you call the aura. By the way, it is not at all like an air, but like the surging upward of something more positive. When it gets to the neck I am gone; the explosion occurs. Below that I can avert the wretched thing, either by rising or rolling over, for it never comes except I be on my right side No mental effort suffices to check it."

I have notes of two males who suffer only if on the right side, but I have not always made inquiry as to this point.

The aura is said at times to be like a tingling, or else is described as an upward surge of indescribable nature, and at times only rises from the epigastrium. Often there is none. Once felt in any case, it usually continues in some form to precede all future attacks.

There is another form of warning, which patients only succeed in

describing as a state of brain which foretells the shock. I have heard this called a humming, or buzzing, within the head.

Hysterical women are often quite unable to stop the shocks, or the aura is too swift to be a timely warning. It is rare to find any grave result. A few people become vertiginous, but not severely. At first, alarm causes emotional scare and a quickened heart, and in some few, even when repetition has lessened the terror of the shocks, they cause a more prolonged palpitation of the heart. In a few minutes, when again sleep is near, comes another shock, or there are a number of slight attacks, as of a bell, or a guitar string twanged, and by degrees fading away; visual discharges less commonly recur in this manner.

I have over and over met with cases of sensory shock in the daytime, but only in the hysterical. In some few people they occur during sleep, and awaken the patient, but their habitual place is in the prædormitium.

All of these curious outbreaks represent, as a rule, the "coarse stuff" of sensory product, or something near it. There is sense of shock alone, or this in succession with noise or light, or both. The noise is rarely comparable, as to note of music, or as to a bell, or a string vibrating. And so also of the optic explosion. There is light, violet or pale yellow. No visions appear; no voice calls. It is "primary sensory stuff," and no more. In the one case connected with smell, the patient had an epigastric aura, and smelt bananas. She had anosmia.

These singular symptoms are found in some neurasthenics, in hysteria, and most often in men as a result of over-use of tobacco-smoking. I first knew of it in my own case, during an attack of neurasthenia, many years ago, and soon learned that it was immediately due to my cigar. I can assure you that one's first acquaintance with it is most terrifying. Bromides and strychnine control it, as I have elsewhere stated.

I pointed out years ago the interesting resemblance of these innocent attacks to epilepsy, and Hughlings Jackson has also noted the fact. Bennett,[1] in a paper on the "Sensory Auras of Epilepsy," describes cases in which the signal-aura consisted simply of crude sensation, such as tingle or pain, which he calls sensory epilepsy. These are sensory cortex centre explosions, with consciousness and without spasm.

Next to touch-aura in epilepsy comes most often optic-aura—sense of light, or definite color with form. In the præsomnic explosion the visual phenomena are still more crude than in these. But in epilepsy, auditory auras are rare, and gustatory and olfactory auras still more uncommon. Certainly, many epileptics who have auras at times experience these alone. The patient feels as if struck by a sharp blow, or perceives a noise in the head, or sees red fire, or a flash of light, and has

[1] Lancet, April, 1889.

no fit. Or else he has a subjective taste, or, like a physician I know smells human ordure for half an hour, and may fail to have the usual sequent spasms. These are very like such præsomnic shocks as give us in their completest form a sense of tingling, etc., which, rising, ends in a more abrupt sensory discharge, as of a sensation of shock, light, or sound, or these variously combined, as does also occur in epilepsy sometimes, as I have seen. Again, too, in the subjects of sleep-shocks are found those who have in the præsomnic state conditions of terror or daze, which are brief, and represent explosions in the intellectual or emotional sphere, like the dazed or dreaming states of some epileptics. And, curiously enough, this, too, may in our illustrative shocks be preceded by a sensory aura of one or two senses.

In epilepsy with auras we may have, first, an aura—*i.e.*, a sensory discharge, usually simple tingling, and then a sense of flash or sound, or of light and sound together; the centres being, one may notice, in juxtaposition.[1]

In præsomnic discharges the discharge is simple, or preceded by tingling—true aura—vague epigastric sensations. The analogy to epilepsy is closer when, as often occurs, an uncontrollable jerk or flap of the whole body ends the attack. With motor centres pathologically over-excited, or capable of being morbidly overcharged, widespread epileptic motor phenomena may follow the sensory discharges, and in early cases of sensory explosions, hysterical convulsions of mild type may result, and thus bring us still more near to the sequential chain of epileptic conditions. On the other hand, epilepsy is not a disorder which haunts the præsomnic time. However close the apparent analogy, there must be a wide difference between it and these sensory explosions.

Lastly, there is a form, which I have seen but twice, in which we have an aura—a flash-shock or sound—and a sense of pain darting down the cervical spine, and then along both arms to the finger-ends.

Sleep-jerks. Chorea.—In the motor sphere are certain disorders which trouble the sleep, or præsomnic state in hysteria or neurasthenia, and which are only distinguished from phenomena found in health by their excesses. We all have had the common experience of a sudden jerk of the body as we were falling asleep. This, in certain cases, is exaggerated as to degree and number, and is also found in the sleep. I have seen many cases in which, scores of times in each night, the sleeper was awakened by a violent motor discharge of every muscle at once. In others the jerks are of arms or legs only. Probably, what are known as "foot fidgets," which oblige the sufferer to move in order to get rid of an ever-recurring sense of unease, are, too, of like parentage, and are to be seen in all degrees of intensity. I was lately consulted by a Western

[1] Angular Gyrus and Superior Temporo-sphenoidal Convolution.

banker, æt. forty-six, to appearance well. No organ was diseased. He had passed successfully through a time of great financial trouble, and in its midst his wife fell ill. After she recovered he began to be a poor sleeper, and exhibited in turn a variety of sleep troubles. He had a mild form of shock—*i.e.*, light and noise. Disuse of tobacco aided these and improved his sleep, but, somewhat later, he began to have jerking in sleep. An arm, or the leg, or the body was violently moved, so as to wake him up, and this, he declared, took place countless times in the night. Still later he lay awake with a horrible unease in the legs. He moved about and got ease. If he lay still, he had to move again.

These motor discharges at times assume, through their frequency and severity, such importance as to affect health by the destruction of sleep which they occasion. An instance is given in my book of a woman weighing two hundred pounds, who spent her nights in a series of motor explosions so vigorous as at times to break the bed-slats. She has told me that she believes herself to have had as many as a hundred in a night; the whole body moving violently in sleep with a jerk like the leaps of a dying fish.

A different form of unease is seen in children who nevertheless seem to be well. Their sleep remains unbroken, but they roll over, twist, turn, wriggle, and continue to do so for hours. Possibly they are dreaming, but of this there is often no evidence, and they are not affected in health by this extraordinary restlessness, which may remain as the habit of a year or more. I have over and over watched these little ones in a sleep which permitted them to roll over and bend the body and move the limbs, until it seemed scarcely possible that they could remain through it all in a state of slumber. A little pause might follow and then another period of nearly constant movement.

In adults the extreme of restlessness is very uncommon, and means more than in childhood. Of the hysterical sleepers much might be said, but in them this form of activity during sleep is seen at times.

In the singular ataxia of hysteria, which I described a few years ago, the early stages of the disorder are apt to exhibit on waking an ataxic condition, which becomes increasingly worse, and at last continues through the waking hours. More commonly the ataxia comes on by degrees, and only in the day.

Lastly, in relation to the motor sphere are the rare examples of chorea seen only for a time on waking from sleep, of which elsewhere I find no mention. As regards this, I may remark that some early ataxics, and some neurasthenics, are apt to be unsure of their movements for a little while after waking.

CHOREA IN THE POST-DORMITIUM.—A. B., aged fourteen years, menstruating regularly; somewhat anæmic, but in other respects healthy.

Last spring, in the month of March, she was attacked by a singular

form of chorea. She had this trouble at no time except in sleep and on waking from sleep; on either occasion it was in attacks which did not endure very long. Her mother, who frequently watched her in the night, said that three or four times in each night she became restless, kicked off the covers, and began to move her hands, slowly flexing or extending them until at last the arms also moving, a general choreal movement ensued, which, at the same time, affected the legs, arms, and body, but never the face. The attacks affected her almost always when she awoke from sleep, during the time she was suffering from this disorder. In the warm summer weather it disappeared. It has returned again recently. She has been under my care for some time, so that I have had an opportunity of seeing that she is a person in perfect health with no organic disease about her on which I can lay a finger. The attacks in the night are very rare, but she scarcely passes a morning without waking in this choreal condition. The spasm lasts from a half to three-quarters of an hour, and by degrees fades away. She apparently has no control over her movements, and in this respect they differ from ordinary choreas, except of the worst kind. This special manifestation of chorea must be extremely rare. In the experience of many years (in which I have seen a multitude of cases) I recall but three or four of this character. It is mostly confined to sleep, or to the awaking state, not apparently existing during the day. I have no hesitation, however, in classing it as chorea, because it readily yields to the treatment which is given to choreal cases, and because, in one instance, it occurred in a child who had had two previous attacks of chorea.

This instance is, perhaps, worth relating:

C. J., a clever little boy of about twelve years—not very strong, nor very active-minded; never rheumatic; heart normal; not very fond of out-door sports, and somewhat anæmic—was attacked one spring with chorea, from which after two months he recovered. The following spring he was attacked again; this attack lasted seven weeks, after which he again got well. The next spring it was replaced by the peculiar form of post-somnic chorea, of which I have spoken. He had absolutely no chorea during the day. He usually woke up about half-past seven in the morning with choreoid movements of the hands; both sides were alike affected. They were not in character like those of the girl mentioned above, and were more distinctly under control. For half an hour, however, he could not pick up anything without dropping it. What struck me with him, also, was that the face was not concerned in any way; nor did it affect either leg. Sensation did not appear to be affected, and he was relieved by the ordinary arsenical treatment and cold douches.

Tonic Spasm is another rare trouble born of slumber, and lasting after it. I quote the only cases my note-books afford:

Mr. J. C., aged forty-five years, merchant, had syphilis and distinct secondaries at the age of twenty-three years. Was well at the time of the malady about to be mentioned—that is, he had no perceptible organic trouble.

About four years ago he began in the early mornings to wake up with rigidity of the legs. This was so extreme that it was impossible for him

to bend the ankles or knees, or to elevate the knees at all. If they were lifted by another with difficulty, they fell slowly in extension. It was truly, therefore, a distinct tonic spasm. If at that time he had excess or defects of knee-jerk I cannot learn.

This state continued to show itself for over two years, occurring at intervals; sometimes taking place every morning for a week, then lapsing for a month, but never existing at other times than when he came out of sleep. If he woke up in the night he occasionally had this same condition; but this was far more rare. It was commonly a morning affliction, and lasted for a few minutes, or at most an hour.

After a certain length of time the symptoms disappeared, but, owing to a bout of drinking, they renewed themselves. Again he got well, and a period of two years elapsed without further trouble. He had begun to have vertigo, followed by difficulty in controlling his water, and this was followed by incoördination, and the entire range of ataxic troubles to which he is now a victim.

I quote another case as a still more remarkable example of rigidity developed in sleep and continuing for a time after waking:

The patient was a man in good circumstances, aged forty-five. He was in the habit occasionally of awakening in the middle of the night with rigidity of the legs. The limbs were violently extended, the feet being so completely flexed as to be straight with the line of the legs. It was almost impossible to lift the legs without lifting the whole trunk, so tightly were the muscles contracted and so rigid was the whole mass, including the intra-pelvic group. This did not seem to be due to anything in the way of specific disease, nor to bad habits. The man had no disease to which I could relate it, except that he had been for many years a dweller in the lower part of the city, and had had attacks of ague year after year, and one very severe attack of remittent fever. Beyond this there was nothing, and these symptoms had long since disappeared; neither spleen nor liver was enlarged; nor, at the time of the rigidity, was he suffering from any malarial difficulties. The kidneys, heart, and lungs were alike sound, and to this day I remain puzzled as to the causation of this very peculiar malady. I saw him several times, because he used frequently to ring me up in the night in order that I might witness this affection, which was painful from the intensity of the contraction of the muscles. I have heard him scream from what he described as "positive agony." Indeed, nothing relieved it except full hypodermics of morphine, under which, slowly, within a couple of hours, the muscles would relax, but always after an attack would remain extremely sore for days together. He finally ceased to suffer.

I have seen a disorder of the same kind, or something similar, in hysterical women, but even among them it is very rare, and it is not necessary for me to go into details. The state is merely an hysterical curiosity. I mention it to complete the list of peculiar cases which I select from the odds and ends of my note-books.

Respiratory Failure in Sleep.—I conclude this study of "The Disorders of Sleep" by calling attention to one of very great interest. I believe that it has been described by the late Professor Samuel Jackson,

but I have been unable to find his paper, which is not in the catalogue of the Army Medical Library. I recall, however, hearing him speak of cases in his lectures.

Where, for some reason, the respiratory centres are diseased or disordered, a man may possess enough ganglionic energy to carry on breathing well, while the will can supplement the automatic activity of the lower centres. But in sleep, these being not quite competent, and volition off guard, there ensues a gradual failure of respiration, and the man awakens with a sense of impending suffocation. This is not to be confounded with the hysterical sleep symptom of sense of suffocation, which is probably closer to the phenomenon of nightmares, and is followed by, or associated with fear, and is soon lost on awakening.

In the cases I refer to, the symptom is sometimes a signal of dangerous meaning. I have met with it in extreme neurasthenia, but in worse forms in locomotor ataxia in its paralytic stage. I have never seen it in labio-glossal lingual paralysis, where it would seem likely to occur. In ataxia it may be due to sudden incompetence of laryngeal muscles, which are liable, late in ataxia, to become paralyzed. Usually, however, it seems to be a failure of the chest and diaphragmatic movements.

Mr. C., aged fifty-six years, had posterior sclerosis, but gave no evidence in the day of respiratory incompetence, although he was distinctly far in the paralytic state. When in deep sleep he began to breathe less and less deeply, and at last, for a few seconds, not to breathe at all. At this moment he moved, twitched, and at last awakened with evidences of commencing apnœa in the color of the lips, tongue, and nails.

When awake a few voluntary efforts to respire relieved him. These attacks became at last so frequent and perilous that a nurse sat by his bed and awakened him as soon as he began to breathe less and less deeply.

As time went on the trouble increased, and whenever he fell asleep respiration ceased abruptly. He was finally worn out with loss of sleep, and died suddenly in one of these onsets of respiratory failure. No post-mortem could be obtained.

I have seen two other cases, but none so remarkable as that I have briefly related. But on the morning after I wrote these lines I saw a case in an ataxic not yet in the paralytic stage. Just at the moment of falling asleep he feels a sense of suffocation, fails to respire, and in great alarm sits up. These attacks probably differ somewhat from those of sleep.

The type differs from that of the ordinary Cheyne-Stokes respiration, being merely, and only in sleep, a gradual failure to inhale—a less and less deep inspiration; but no sequence of rapid breaths ending in dyspnœa.

A STUDY OF THE PATHS OF SECONDARY DEGENERATION IN A CASE OF INJURY OF THE CERVICAL SPINE.

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Although at first sight it might appear that one case of any given disease is like another, and, therefore, that isolated cases are hardly worth placing upon record, yet the one I propose to relate presented features that are not so common as to render them trite, and, at the same time, showed the incorrectness of statements which common acceptation has caused to be looked upon as facts. The subject of the results of spinal injuries has long occupied a large share of the attention of surgeons; and neurologists and anatomists have been much occupied of late in studying the upward and downward paths of the secondary degenerations which follow injuries of the spine, whether traumatic or the result of the processes of disease; for, beside the interest which always attaches to the study of pathology, it being an acknowledged fact that the more perfectly we understand the morbid processes of any disease the more competent we are to treat it, anatomists have learned that from a study of the course of the secondary degenerations they can best follow the paths of the nerve fibres from their origin in the brain to their final termination in skin, muscle, or elsewhere, according to what their special function may be.[1]

Henry B., thirty-five years of age, a sailor by occupation, and born in England, was admitted to the surgical ward of the Pennsylvania Hospital August 20, 1888, and died September 15th of the same year. During heavy weather at sea, ten days before his admission, he was struck by a wave and dashed against the bulwarks, striking the back of the head and neck against the rail. It was found at once that he had lost all sensation and power of motion from the clavicles downward, and from the time of the accident he had retention of urine and incontinence of feces. When admitted to the hospital there was a large bedsore upon the back, entire loss of sensation below the clavicles, and abolition of the reflexes. Examination of the urine gave negative results. The temperture varied between 100° and 103$\frac{3}{5}$°. There were no marks of violence nor signs of fracture or luxation of the vertebræ. The treatment consisted of the administration of iodide of potassium, the use of a water-bed, and a poultice upon the chest. Even upon his admission there were some coarse mucous *râles* to be heard upon examination of the lungs, and this condition gradually increased until the lungs were full of *râles*,

[1] My most hearty thanks are due to Dr. Packard, my colleague at the Pennsylvania Hospital, who placed the case at my disposal and under whose charge the patient was while in the ward, and to Dr. W. D. Green, the resident physician, who made the post-mortem examination and prepared the history for me.

and he became unable to expel the mucus; abdominal tympany came on and he became comatose and died seemingly of heart-failure.

Post-mortem examination showed that there was neither luxation nor fracture of the spine, but a small extra-dural hemorrhage into the spinal canal at the level of the seventh cervical vertebra.

In regard to the condition of the cord it will be necessary to give some details of the methods employed for its examination and preparation for microscopical study. When first removed the dura mater was slit up upon both the anterior and posterior aspects to expose the pia and nerve-roots and the substance of the cord cut transversely at many points, the sections being made at intervals of from an inch to an inch and a half. Though it was then examined with ordinary care nothing abnormal was noticed, and it was placed in Müller's fluid for preservation and hardening. After the tissue had been a few weeks in the fluid, when removed for examination it was at once obvious that it presented marked evidence of disease. When the lower part of the cord was looked at, a fresh transverse section having been made, it was seen that the gray matter was stained of the yellow tint produced by Müller's fluid, and that the greater portion of the white matter had the usual greenish color, but there was in the antero-lateral region upon both sides a large spot which was roundish when the cord was looked at, as already stated in horizontal section. This area was of a yellow hue, the shade of color being as nearly as possible the same as that taken by the gray horns. Upon cutting across the cervical portion—and it must have been at about the level of the seventh vertebra, the precise relation of the parts to the vertebræ was unfortunately not preserved, the nerve substance was seen to have lost all apparent uniformity of geographical arrangement, no distinction between gray and white matter could be discovered. The cord when thus seen presented a surface somewhat rough and irregular—and was of an almost even dirty yellow color, presenting at no point the greenish shade which is taken by the white portion of normal spinal cord. At all points, the cord below this area was natural, so far as naked-eye appearances went, except for the irregularly round spot in the antero-lateral columns which was everywhere distinctly visible, extending down into the lumbar region, where it was perhaps more evident even than above, and for two comma-shaped spots of yellow in the postero-external columns (see Plate I., Fig. 2 *a*) in the upper dorsal section cut a short distance below the area of injury. Unfortunately but little of the cord above the position of disintegration was preserved, but what there was showed perfectly distinctly that the yellowish spot in the antero-lateral columns was absent, but that a portion (see Plate I., Fig. 1 *a*) of the posterior columns was of the same yellow color—thus showing ascending degeneration above the area of injury.

Pieces were taken for microscopical study from the region of destruc-

tion in the cervical portion; a short distance below this area in the upper dorsal portion; from the mid-dorsal, and from the lumbar region. Two sets of these were prepared, the one by the celloidin method and stained with Weigert's reagents, the other in paraffine and stained with carmine, and carmine and sulpho-indigotate of potash. A third set were prepared according to the method of Schultze, which has been described in the *American Monthly Microscopical Journal*, December, 1889, by Dr. George A. Piersol, who prepared these sections for me—the staining material being carminate of soda. Sections were also prepared and stained by the Schultze method of a piece of the cord, a very short distance above the area of degeneration, from the cervical enlargement. Teased preparations were also made both of tissue taken directly from Müller's fluid, and, after being stained in carminate of soda and these mounted, some in glycerin and some in balsam, of portions of the antero-lateral (crossed) pyramidal tract which had been carefully dissected out, and of the anterior white substance which was still healthy, for comparison.

It will probably be best to begin the description of the histological conditions observed with the disintegrated area, and afterward to consider the secondary degenerations passing up and down the cord.

The sections were taken as nearly as can be judged from about the region of the seventh cervical vertebra. The large artery at the edge anteriorly presented some thickening of the intima, which was more marked upon one side than the other; others at the posterior surface also showed moderate increase of thickness of intima from nuclear proliferation. Veins at the posterior surface presented evidence of inflammation, and one contained a well-organized laminated clot occluding its calibre. The greater portion of the tissue of the cord itself had undergone complete disorganization, but the extent of this and its geographical distribution will be better understood by an examination of Plate II., Fig. 1, than by any description. Toward the periphery anteriorly a thin fringe of tissue remains, and posteriorly the whole of the posterior columns—except a small portion (constituting perhaps one-sixteenth to one-eighth of the area) near the commissure and quite a large area of the lateral column—upon one side are in a condition quite or nearly normal. In both these areas the nerve-fibres can be readily distinguished, and even the axis-cylinders are sharply outlined and well defined. The rest of the tissue, including thus a small part of the anterior portion of the posterior columns and much the greater part of the anterior white substance, with the whole of the gray matter, is completely disorganized and is made up of the so-called fat-granule cells, swollen and distorted nerve-fibres, corpora amylacea, large nucleated cells staining very red with carmine, and much space, apparently empty, which was probably filled with colloid material or liquid, for if it had not been so the tissue

would have collapsed instead of hardening in Müller's fluid. At the junction of the uninjured tissue with the disintegrated portion everywhere there is a boundary layer of material, greater or less in extent, which stains very bright red with carmine, showing the condition of cell activity which is to be looked for at the periphery of areas undergoing any stage of the process of inflammation.

In order to facilitate and make clearer the description of what was observed in regard to the condition of the cord above and below the area of destruction which has been described, two sets of diagrams were made (see Plate I.). These represent, upon the one hand, the paths of degeneration as their outlines would have been described from a macroscopical examination of the tissue alone after it had been hardened in Müller's fluid—for, as has already been stated, no abnormality was noticed when the fresh cord was examined; and, upon the other, these same paths as outlined from a careful microscopical study of the state of the nerve-fibres and other elements made from very good sections cut and stained in several different ways and from teased preparations.

Sections made a short distance above the area of disintegration, which, as already stated, was at about the level of the seventh cervical vertebra, showed that the tissue was not anywhere in as good histological condition as that taken below that region and further away from the area of transverse myelitis. Though the greater part of the nerve-fibres were natural looking, there were at all portions of the cord at this level scattered fibres which were more or less degenerated. The position in which the fibres are in the best state of preservation is the lateral (crossed) pyramidal tracts. An examination of the two diagrams (Plate I.) gives the best understanding of the apparent geographical distribution, both macroscopical and microscopical, of the paths of secondary degeneration.

It is evident that the gross appearances are very misleading, but this matter will be discussed later. Microscopical examination shows that in this particular case the whole of the posterior columns had undergone some degeneration, the greater portion, and that toward the centre lying nearest to the commissure in particular, having been almost entirely destroyed, there being hardly any normal fibres remaining, while a rather narrow band at the posterior edge showed only a partial destruction of tissue, it consisting of nerves whose outlines were sharp and distinct, and many others showing partial destruction of the axis-cylinders, some of these being swollen or fatty, or, again, very granular-looking and stained intensely red with carmine. Some of these latter were undoubtedly axis-cylinders, swollen, disintegrated, and inflamed, for in preparations that had been stained with carminate of soda and then teased out into shreds (see Plate II., Fig. 3) many nerve-fibres could be seen in which the axis-cylinders were very red, distorted to all sorts of

shapes, and granular. In places the irregular swellings were so great as to be as large as the diameter of the myelin sheath.

Toward the inner sides of the lateral (crossed) pyramidal tracts the areas of degeneration abutted directly against the posterior gray cornua, there being positively no band of healthy or even partially healthy tissue separating them.

In the anterior white columns, extending around at the periphery from the posterior gray cornua, well toward the anterior and involving the whole of the direct cerebellar tracts, and what Gowers describes as the antero-lateral ascending tracts, were upon either side belts of tissue which had undergone partial degeneration, the degree of change being about the same as that of the most posterior part of the posterior columns. The area occupied by the degeneration can be better understood from an examination of the diagram (Plate I.) than by any description. Almost directly opposite the lateral branch of the anterior gray cornua upon one side, the red stained spots that have been mentioned were larger and more numerous than anywhere else—their appearance is well represented in Plate II., Fig. 2—and the teased preparation (Plate II., Fig. 3) proves that they are changed axis-cylinders.

In the gray matter some of the large multipolar cells were seen to be round and granular in appearance and no branches could be seen, nor nuclei, while others, again, were sharp in outline, the nuclei distinct, and several branches remained attached to them; whether these appearances were due to disease or not cannot be positively stated.

In the sections from the upper dorsal cord a short distance below the area of transverse myelitis, and in those from the mid-dorsal and lumbar portions, the degeneration in the lateral (crossed) pyramidal tracts was very evident, and its appearance, as compared with the healthy tissue from the anterior portion, is most graphically shown in Plate III. The nerve-fibres are swollen, in many instances the axis-cylinders having disappeared, or again, they are distorted and irregular in outline, and a very marked feature is the overgrowth and increase of the neuroglia, which has, at the same time, lost much of its regularity of arrangement.

The strands seem to be irregularly thick, have lost their sharpness of outline, and no longer present the natural appearance of running in a regular radial manner inward from the pia mater from which they start. The diagrams (Plate I.) show better the areas of degeneration than any verbal description. It may be seen how different are the impressions of the geographical distribution of these areas to be derived from the microscopical and macroscopical appearances, which latter are very misleading. The large comma-shaped spots in the posterior columns in the sections taken from the upper dorsal portion do not appear upon microscopical examination as areas of degeneration at all, the only change which corresponds being a distinct, but not very great, increase of thick-

ness of the neuroglia, which is stained very red by carmine, and a separation of the fibres as if by effusion. A noticeable feature is, that in all the sections taken from below the area of destruction—to a slight degree in those from the upper dorsal region and markedly in the mid-dorsal and lumbar regions—in the posterior columns toward the commissure, the nerve-fibres, though in a good state of preservation, are very much separated as though by the effusion of some fluid or colloid material. This could not have been the result of any faulty technique, as it is plainly to be seen in sections prepared in three entirely different ways. In several of these sections cut below the area of transverse myelitis, there was a strong suspicion of the existence of slight degeneration in the anterior (direct) pyramidal tracts, but it was not absolutely certain, and, therefore, not figured in any of the diagrams. With reference to the extent of the degeneration of the lateral pyramidal tracts, an examination of the diagrams shows that, as their geographical relation was determined by microscopical study in the sections from the upper dorsal region, the direct cerebellar tracts were left untouched, and a little more than is commonly described as belonging to this region, for the bands of healthy tissue at the periphery extended well back to the posterior gray cornua, the degenerated matter nowhere coming in contact with the enveloping pia mater, while at the inner side the degeneration extended flatly up against the posterior gray cornua, leaving no healthy tissue in what is described by Gowers as the lateral limiting layers. In sections from the mid-dorsal region the areas of degeneration were closely parallel to those last described. In the lumbar region, however, the conditions differed markedly (see Plate I., Figs. 4 *a* and 4 *b*) both from those found in sections taken from portions of the cord above and from the macroscopical appearances. The areas of total degeneration were separated from both the periphery and the posterior gray cornua by bands in which some slight change had taken place, but in which the greater part of the fibres were still in a good state of preservation. The spinal nerves, where any of them are included in the sections, exhibit marked degeneration; the degree of this is greater in the sections from the lumbar and mid-dorsal regions than in those from the upper dorsal, though still unmistakable, even in the latter area. There are also large clear spaces between the bundles of fibres where the bloodvessels lie as though there had been distention of the lymph sheaths. The character of degeneration of these nerves presents a marked contrast with that in the cord itself, looking as though a mere shrinkage and wasting of the tissue had occurred as a consequence of disuse, very different from what is seen in the cord, which exhibits all the appearances of a more or less active inflammation—in brief, the one looks as if it was a secondary and remote consequence of something that had occurred far away, the other like an active process going on where

it is seen. A marked feature in the sections taken from these three regions below the area of transverse myelitis is, that the columns of degeneration in the lateral pyramidal tracts in the lumbar sections cover a much larger area than they do in the mid-dorsal, and fully as large as in the upper dorsal, this being contrary to what is said commonly to occur—that the areas of degeneration became progressively less as the region of original injury becomes more distant.

Peculiar interest, perhaps, attaches to this case, in that the use of the Schultze method of staining made it possible to study the paths of degeneration and their precise degree and geographical outlines with much more precision than would have been possible by older methods. The Weigert method and very good paraffine preparations stained with carmine, and carmine and sulpho-indigotate of potash, gave results far inferior to those obtained with the Schultze stain, carminate of soda.

The degree of degeneration was slight as compared with that commonly found in long-standing cases of tabes or other forms of spinal sclerosis, which the Weigert method demonstrates so beautifully. The Weigert method, so far as the study of transverse sections of the white substance of the spinal cord is concerned, depends upon the black or bluish-black color taken by the myelin sheaths, and this prevents in healthy tissue any accurate study of the state of the axis-cylinders, which are so closely surrounded by the dark-colored material that their outlines are not distinct. In old cases of spinal sclerosis the myelin, as well as the axis-cylinders, has disappeared or undergone so much change as to be no longer capable of giving the characteristic color; and, therefore, the method demonstrates most graphically the degenerated areas. In this case, though, the degenerative processes had not progressed so far, the man having lived about five weeks only after his injury, and the changes had taken place principally in the axis-cylinders, leaving the myelin still in sufficiently good condition to take the characteristic color; and therefore, though the changes were sufficiently great for the Weigert method to show plainly their presence, it entirely failed to reveal the geographical outlines and extent, as shown by the other preparations.

The question whether these secondary degenerations of the cord are inflammatory, is one which it would seem possible only to answer in the affirmative, if the definition of Burdon Sanderson of what constitutes inflammation be received. In his classical article,[1] he defines it as follows: "By the 'process of inflammation' I understand the succession of changes which occurs in a living tissue when it is injured, provided that the injury is not of such a degree as at once to destroy its structure and

[1] Holmes's Surgery, vol. v. page 729.

vitality. With reference to their origin, all inflammations may be comprised in two classes—extrinsic and intrinsic."

This definition is very comprehensive, and would seem to be as good a one as the subject to be defined admits of; the prime difficulty, however, remains—which is, to decide in individual instances among the very long "succession of changes" which occurs, often extending in an unbroken line to regions far remote from the original seat of injury, at what point precisely to draw the line, and say, upon one side the changes are truly inflammatory, and on the other are secondary and non-inflammatory. Certainly no one would pretend to call paralysis of a limb an inflammation, though caused directly by some inflammation of the spine which produced at the original seat effects the inflammatory character of which no one would pretend to deny. In the individual case being dealt with, a careful examination of the nature of the changes which occurred seems to make it sufficiently clear that those in the spine itself were truly a part of the process of inflammation, while those outside of this tissue, beginning therefore with the spinal nerves, were secondary, and would be more correctly described as atrophic than inflammatory.

The difference of the appearances in the two positions is most striking, in the spine the axis-cylinders and sheaths being greatly and irregularly swollen (see Plates), as though from an active inflammatory process extending upward and downward from the original seat of injury throughout the cord, while the spinal nerves, when changed at all, are shrunken so as to be much reduced in size—as though they were merely dried up from disuse—none of the commonly accepted signs of inflammation being present. The process of change was an unbroken one, beginning at the seat of original injury as an active inflammation and extending upward—how far, unfortunately, cannot be known, as the condition of the brain was not studied—and downward through the cord to the spinal nerves, and doubtless much further if it had been sought for, with lessening intensity until it ceased to be any longer properly named an inflammation, but became an atrophy.

The fact is a curious one—and its cause will probably be learned in the future, perhaps from a careful study and fuller understanding of the circulation in the parts—that the change from inflammation to atrophy is quite abrupt, and that the line is at the point of separation of nerve from cord.

It will not be amiss once more to call attention to Plate II., Figs. 2 and 3, showing, as they do, such very great swelling of the axis-cylinders, and to recall to attention the fact that no condition in any wise parallel to this was found in the spinal nerves, which, although in the nature of things they must have undergone their changes later than those in the cord, exhibited only alteration which could be described as atrophic; and to emphasize the conclusion, which would seem a

necessary one, that the so-called secondary degenerations of the spinal cord are in truth more correctly to be described as direct extensions of inflammation.

What part of the changes at the seat of injury was due to the direct effect of the blow producing rupture, hemorrhage, and immediate destruction of the tissue, and how much to the disturbance of the circulation and consequent failure of nutrition, it is quite impossible to say, but it would seem certain that the disintegration instantaneously produced must have been very great, for there was absolute loss of function, as evidenced by the complete loss of sensation and motion from the instant that the blow was received.

So far as the ascending and descending secondary degenerations are concerned, a study of their geographical relations and extent—and a very correct understanding of these may be had from the diagrams—brings to light several features of interest. It may be premised that, though the paralysis was absolute from the reception of the injury, the transverse myelitis was not; a large part of the posterior columns was structurally little, or not at all, injured, and two bands of tissue in the anterior white substance (see Plate II., Fig. 1) also were made up of nerve-fibres natural in appearance. A most important point which the study of this case demonstrates is, that any deductions drawn from an examination of the macroscopic appearances alone would lead to very false conclusions with regard to the paths and extent of the secondary degeneration, though the naked-eye appearances of disease were so manifest, after the tissue had been in Müller's fluid, that they could not have been overlooked by anyone. It is in the highest degree likely—nay, almost certain—that in the past erroneous conclusions in regard to the paths of degeneration have been recorded, owing to observers having trusted to the gross appearances alone, and to the fact that by older methods of preparation and staining it was almost impossible to obtain sections which would show the condition of all the nerve-fibres throughout whole sections down to the minutest details, as by Schultze's method. Beyond question, it is difficult, or even impossible in some instances, to determine the presence or absence of disease by a naked-eye examination alone of fresh spinal cord. Soaking in Müller's fluid for a week or two will very likely bring to light diseased appearances which cannot fail to be recognized, but the study of this case demonstrates that if the color-changes thus produced be exclusively relied upon; and it be concluded that wherever the white substance stains of a yellow color instead of the greenish hue which is generally taken by healthy white matter, that such areas are degenerated, and all parts taking the greenish tinge are healthy, a grave error will be made. The diagrams (Plate I.) show, upon the one hand, the outlines of the yellow-staining spots in the white substance drawn from a naked-eye examina-

tion, and, upon the other, the actual areas occupied by degenerated nerve-fibres; the appearances presented, as is readily seen, do not by any means correspond. In the sections from the cervical swelling above the myelitis area (Plate I., Figs. 1 *a* and 1 *b*), the whole of the posterior columns was more or less degenerated, a narrow band at the peripheral portion being slightly so, while that toward the centre had undergone complete disintegration, very few axis-cylinders being distinguishable. This is, perhaps, no more than might have been looked for, as the section was cut so short a distance above the region of almost total destruction, and if other sections could have been had from regions still higher, it is likely that the degeneration might have been found confined to the postero-median (Goll's) column, as is said usually to take place.

The degeneration of the whole of the direct cerebellar tracts and of a portion, at least, of the antero-lateral ascending tracts (as described by Gowers), is what usually occurs in ascending degeneration, and, as has already been said, it was in about the area of junction of these two tracts that were found the largest number of the greatly swollen axis-cylinders; the disease process seeming here to be very fresh and active.

The diagram Plate I., Fig, 1 *a*, represents the area of degeneration, as shown by macroscopic examination alone, and it may be seen that it is misleading, as it makes it appear that there was no degeneration of the posterior portion of the posterior columns at all, and none of the anterior part of the postero-external, nor any of the direct cerebellar or antero-lateral ascending tracts.

Figs. 2 *a* and 2 *b* represent the appearances, macroscopical and from microscopic examination, below the region of destruction, being of the upper dorsal region. This, as represented in Fig. 2 *b*, shows that the degeneration was of the lateral pyramidal tracts and lateral limiting layers alone. The appearances, as studied macroscopically, are very different—it would seem as if (Plate I., Fig. 2 *a*) the lateral limiting layers had remained healthy, while the greater portion of the direct cerebellar tracts appeared to be involved by the degenerative process; further, there appeared two comma-shaped spots in the postero-external columns, which microscopic examination failed to demonstrate at all—the only change, as has already been stated, that was found in this area being a general separation of the nerve-fibres, as though by some effusion and overgrowth of the neuroglia. This comma-shaped downward degeneration is alluded to and figured by Gowers,[1] but by him is represented as being of much less extent than in my case. It is very strange, and at present inexplicable, that it should have appeared merely as a color change and that no degeneration of the fibres should have been found, but only a separation and connective tissue increase.

[1] Diseases of the Nervous System, vol. i. pages 118 and 120.

Plate I., Figs. 3 *a* and 3 *b* show that though macroscopically it appeared as if the columns of degeneration extended externally directly up to the periphery, microscopic examination showed quite a wide band of tissue (the direct cerebellar tracts) which had remained healthy; the lateral limiting layers were involved.

In Plate I., Figs. 4 *a* and 4 *b*, quite a different appearance is prepresented: macroscopically, the degeneration seemed to extend to the periphery, but to leave the lateral limiting layer healthy; microscopic examination showed that the degeneration in truth occupied the whole area outside the posterior horns, but that at the centre it was great in degree, while the lateral limiting layers and direct cerebellar tracts, though degenerated, were so in a less degree. It is curious that nowhere was there any positive descending degeneration of the direct pyramidal tracts, though some of the sections presented appearances suspiciously like it, and, contrary to what is stated to be the usual condition, the degeneration in the lateral (crossed) pyramidal tracts did not become less in extent from above downward as the distance from the seat of injury became greater. On the contrary, the degenerated areas in the lumbar sections, besides being as large as they were higher up the cord, presented, if anything, a still greater degree of overgrowth of the neuroglia. It is worthy of note that sections prepared by the Weigert method, though they exhibited distinctly the presence of degeneration, did not outline its extent nor show the histological condition of the component parts very satisfactorily. This was probably due to the fact that it produces its effect by staining the nerve sheaths of a more or less dark color, thus necessarily concealing, to a greater or less extent, the outlines of the axis-cylinders.

In conclusion, it may be well to summarize the points of interest of the case, and to emphasize the lessons it teaches:

First. The use of the Schultze method of staining in addition to the older ones rendered possible a closer study and more complete understanding of the disease than could otherwise have been had.

Second. The suggestion that the changes in the cord would be more properly described as inflammatory than atrophic, as they are usually called, is worthy of notice and consideration. The condition of the bloodvessels described in the sections from the area of transverse myelitis, and that of the connective tissue elements would seem to bear this out.

Third. The enormous size of the axis-cylinders, greatest in the antero-lateral ascending tracts above the area of myelitis—a thing the Weigert method did not reveal, and which was only made plain by the Schultze stain, would seem to be one of the earliest changes to take place, the white substance of Schwann remaining apparently unaltered and the large axis-cylinders being in the midst of nerve-fibres apparently healthy.

Fourth. The question is an interesting one and at present entirely unanswerable: What portion of the changes at the area of myelitis was at once produced by the original violence, and how much came on afterward as a consequence of the hemorrhage and disturbance of the circulation and consequent failure of nutrition?

Fifth. The separation of the nerve-fibres in the posterior columns, apparently from interstitial effusion, is curious and worthy of attention. There can be no doubt, either, of its existence below the area of injury throughout the dorsal and in the lumbar cord, for it was plainly evident in sections prepared in three different ways, and cannot, therefore, justly be attributed to any fault in technique.

Sixth. It is worthy of reiteration that the columns of degeneration, contrary to what seems to be universally accepted as always the case, did not become smaller from above downward, for they were larger in the sections from the lumbar than from the mid-dorsal region.

Seventh. The fact that the actual paths of degeneration, as outlined by careful study of the microscopical condition of the tissue, were so different from the areas occupied by the color-changes, the only guide to their understanding macroscopically, is a most important one.

Eighth. It is noticeable, too, that the paths of degeneration do not occupy and confine themselves strictly to the areas usually described. This proves either that the ordinary descriptions are somewhat incorrect, or that there is much variability of each case from every other one.

Ninth. The absence of any degeneration of the nerve-fibres in the areas occupied by the comma-shaped yellow spots in the sections from the upper dorsal region is not easy to explain.

Tenth. In considering the paths of upward degeneration it is curious that the whole of the posterior columns should have been involved, when it is recollected that in the region of greatest destruction, the posterior columns were the portion in the best state of preservation, the nerve-fibres being destroyed only in a very small portion of the front part. This does not tally very well with the doctrine that the change is a degenerative one, and that the disease creeps along the nerve-fibres in the direction of their function.

Eleventh. From the surgical aspect the case is interesting, especially in connection with the question of railway injuries, as demonstrating how complete may be the destruction of the nerve tissues without any bone lesion whatever, whether luxation or fracture.

DESCRIPTION OF PLATES.

PLATE I., × 4 diameters. In Figs. 1, 2, 3, 4 *a* the areas covered with dots are the degenerated regions as determined from microscopical examination alone, the dotted areas being the portions of the white matter which had a yellowish color, instead of green like the healthy portion of the white matter. On the other hand, and in strong contrast, Figs. 1, 2, 3, 4 *b* represent the true areas of degeneration as determined by careful microscopical examination of sections.

Fig. 1 *a*. Cervical portion, above the area of transverse myelitis. The dotted area represents the ascending degeneration as determined by the color changes produced after soaking in Müller's fluid. It occupies the posterior columns alone, and of them leaves untouched the whole of the posterior portion next the periphery, and most of the anterior portion of the postero-external columns.

Fig. 1 *b*. Same region as Fig. 1 *a*, but the dotted areas here represent the ascending degeneration as outlined by careful microscopical study of sections. The heavier dots represent much degenerated regions, the lighter dots those less so. The whole of the posterior columns is degenerated, the anterior portion more so than the posterior, and degeneration extends around at the sides in the antero-lateral columns, occupying the regions called the direct cerebellar and the antero-lateral ascending tracts.

Fig. 2 *a*. Upper dorsal portion, below the area of transverse myelitis. The dotted portions are the regions of descending degeneration as outlined from the gross appearance after soaking in Müller's fluid. There are the comma-shaped spots in the posterior columns and degeneration of the crossed pyramidal tracts. The macroscopic examination made it appear that the lateral limiting layers were not involved, while the degeneration did not occupy all, or nearly all, of the direct cerebellar tracts.

Fig. 2 *b*. Same region as Fig. 2 *a*, but the dotted areas representing the descending degeneration as determined by microscopical study of sections. The crossed pyramidal tracts involved together with the lateral limiting layers, while the direct cerebellar tracts were free from change. No degeneration of the posterior columns.

Fig. 3 *a*. Mid-dorsal region. The descending degeneration here as outlined from the gross appearances seems to occupy the crossed pyramidal tracts and to extend flatly up against both the periphery and the posterior gray horns, and occupying, therefore, both the lateral limiting layers and the direct cerebellar tracts, if the latter extend so far posteriorly in this region.

Fig. 3 *b*. Same region as Fig, 3 *a*. The descending degeneration as mapped out from microscopical examination. It exists in the crossed pyramidal tracts and lateral limiting layers alone. As there is a wide portion of healthy tissue between the column of degeneration and the periphery, the direct cerebellar tract was certainly not involved.

Fig. 4 *a*. Lumbar region. The degeneration here, as determined from examination of the color changes, seems to occupy the crossed pyramidal tracts and to extend quite up to the periphery externally, but to leave the lateral limiting layers uninvolved.

Fig. 4 *b*. Same region as Fig. 4 *a*. The descending degeneration as outlined from microscopical examination. There is here a central column of greatly degenerated tissue (represented by the heavier dots) surrounded at both sides and posteriorly by a less degenerated portion (represented by the lighter dots), which fills up the whole of that portion of the antero-lateral white substance lying between the periphery externally and the posterior horns internally. This column of degeneration is much more extensive than is the one in the dorsal region (see Fig. 3 *b*).

Plate II.

Fig. 1, × 10 diameters, stained with borax carmine. The region of transverse myelitis. The tissue almost all destroyed except about half of the posterior portion of the posterior columns and a band of the antero-lateral white substance at the posterior edge, and a still narrower one at the anterior edge upon the right hand in the picture.

Fig. 2, × about 400 diameters, stained with carminate of soda. Taken from the cervical portion above the region of transverse myelitis. The picture shows greatly swollen axis-cylinders (the large black spots), and was taken from the antero-lateral white column near the periphery of the cord at about the junction of the direct cerebellar tract with the antero-lateral ascending tract.

Fig. 3, × 400 diameters, stained with carminate of soda, and the tissue teased to isolate single nerve fibres. The picture shows a nerve sheath and axis-cylinder, the latter irregularly swollen and granular in appearance. This was from the crossed pyramidal tract in the upper dorsal portion of the cord.

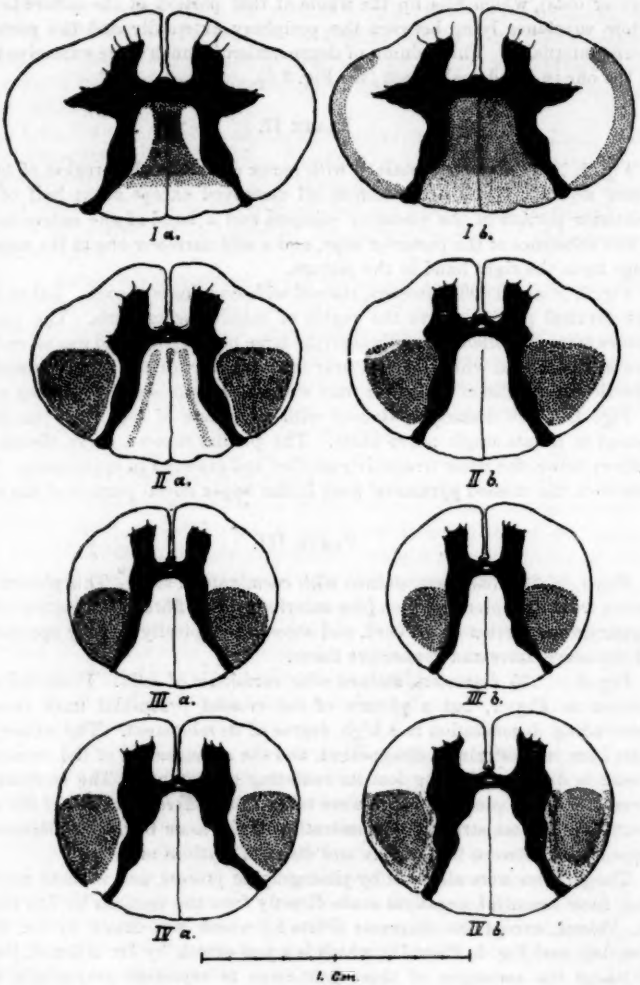
Plate III.

Fig. 1, × 225 diameters, stained with carminate of soda. This picture was taken from the anterior region (the anterior ground fibres) of a section of the upper dorsal portion of the cord, and shows the typically healthy appearance of the nerve fibres and connective tissue.

Fig. 2, × 225 diameters, stained with carminate of soda. From the same section as Fig. 1, but a picture of the crossed pyramidal tract showing descending degeneration in a high degree of development. The axis-cylinders have in most places disappeared, and the arrangement of the connective tissue is distorted, having lost its radiating appearance. The contrast between these two pictures, which were taken from different regions of the same section, is a most striking demonstration of the more obvious differences in appearance between the healthy and diseased portions of tissue.

The pictures were all made by photographic process, and without retouching, from beautiful negatives made directly from the sections by Dr. George A. Piersol, except the diagrams (Plate I.) which was drawn by Dr. B. A. Randall, and Fig. 3, Plate II., which is a pen-sketch by Dr. Allen J. Smith. Without the assistance of these gentlemen to represent graphically what cannot be adequately described in words, my paper would have been almost valueless.

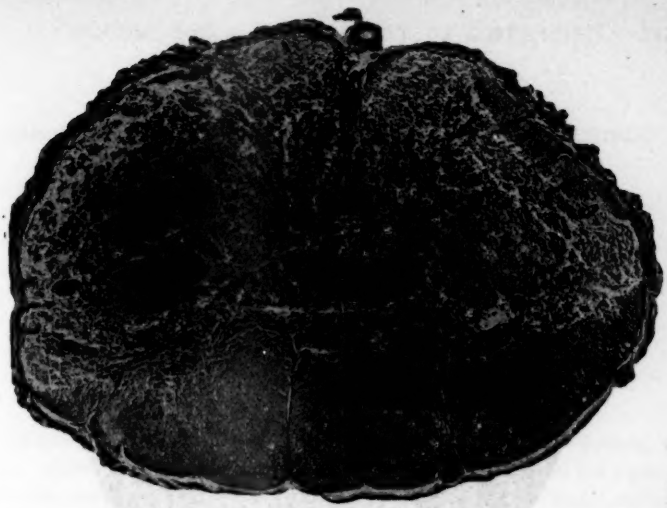
PLATE I.



× 4 diameters.

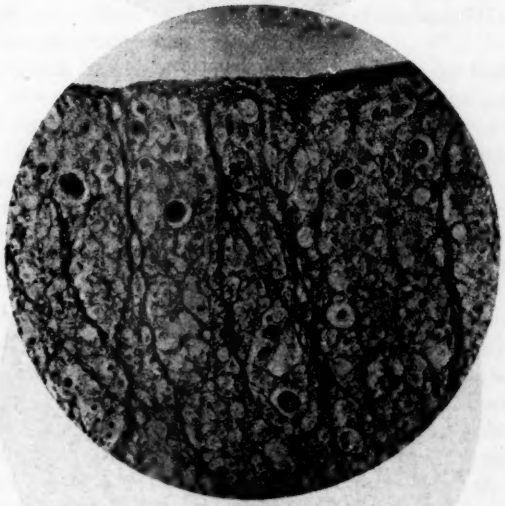
PLATE II.

FIG. 1.



× 10 diameters.

FIG. 2.



× about 400 diameters.

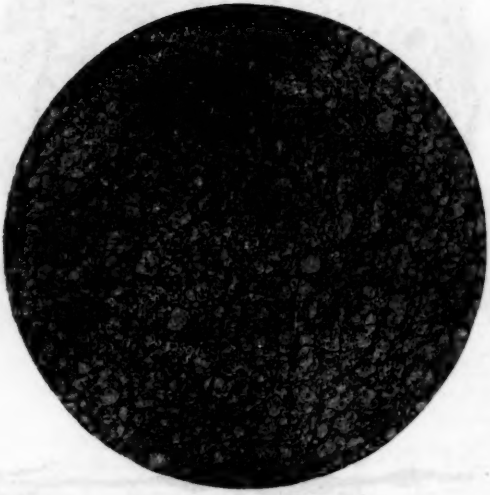
FIG. 3.

PLATE III.

FIG. 1.

× 225 diameters.

FIG. 2.



× 225 diameters.

AN INVESTIGATION INTO THE ETIOLOGY OF PHTHISIS.

By Heneage Gibbes, M.D.,
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AND
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V.

Tubercular Peritonitis.

By Heneage Gibbes, M.D.,

There are some interesting points in this disease which deserve a short notice. In all the cases I have examined of tubercles in the omentum and mesentery the lesion consisted of an aggregation of small, round cells, generally surrounding a bloodvessel. Some of these nodules have a gray translucent appearance to the naked eye, and I have never been able to find any tubercle bacilli in them. Some, however, have a whitish opaque appearance, caused by the disintegration of their central portions; in these I have invariably found tubercle bacilli.

I have made a number of experiments on animals by feeding and inoculation to see whether I could produce these conditions artificially, but I have found I could not rely on so doing by any one method, although I have produced them often. I have found the appearances presented were of two kinds:

1st. An immense number of small bodies, about the size of a millet-seed, studded the omentum and mesentery; they were translucent, and on making sections of them and staining with logwood they were found to be collections of small round cells with a patent bloodvessel running through them.

2d. Numbers of rather larger bodies having a white opaque look and on section showing a number of similar small round cells at the periphery while the centre consisted of a granular débris resembling caseation.

In the first kind I have never been able to find any tubercle bacilli; in the second they are almost always present, and generally in such numbers as to give a distinctly red appearance to the centre of the nodule. I have not been able to find any recorded account of reticular tubercles in this situation. In connection with this so-called tubercular peritonitis it is interesting to note the cases where laparotomy has been performed and has resulted in curing this condition. In several cases the abdomen has been opened under the impression that it contained an ovarian tumor. In one case, recorded by Sir Spencer Wells, the patient was alive and well twenty-two years afterward. Knaggs and Clarke, of Huddersfield,

have recorded similar cases, also Lawson Tait. These cases have, however, been open to the objection that it has never been proved they were actually tuberculosis—that is, the presence of tubercle bacilli had not been demonstrated. At the request of Dr. Bowditch the records of a case have been sent me by Dr. Henry O. Marcy, which remove this objection. The case is as follows:

November, 1886, a woman, æt. thirty, had been under observation in the hospital for some months, suffering from severe pain and emaciation, with uterus fixed. This was considered to be a case of old tubal disease. Dr. Marcy performed laparotomy and found disseminated tubercles in the mesentery and abdominal walls. A small portion was removed for examination. The abdominal cavity was washed out with a solution of bichloride of mercury 1 : 2000 and closed up. Examination showed the miliary tubercles in the portion removed to consist of colonies of tubercle bacilli, and this was confirmed by subsequent cultivation. Recovery followed with an improvement of all symptoms. In the following spring the patient sailed for Europe and in a letter dated August, 1887, she writes: "Am enjoying at present very good health, being able to work again."

This is, as far as I am aware, the only case where an examination has been made for the tubercle bacilli. Since the above was written I have received a very interesting paper, by Dr. William Osler, on "Tubercular Peritonitis," in which is an account of a case where reticular tubercles were found by Dr. Councilman containing numerous tubercle bacilli and no caseation in the nodules. It however, agrees exactly with what I have found several times in artificial tuberculosis in animals where the mesentery and omentum have been affected. I have no doubt other cases will be recorded showing similar facts; in the meantime we have the evidence of one case that numerous nodules containing tubercle bacilli can exist in a serous membrane without setting up a condition of general tuberculosis. The cure of these cases by abdominal section in the present state of our knowledge seems very difficult to explain. Such a weak solution of mercury could hardly have any action on bacilli shut up in these nodules.

Bovine Tuberculosis.

By some authorities this disease is held to be identical with human tuberculosis—that is, by those who hold the view that tuberculosis is only such when the tubercle bacillus is present. Others consider the disease to be different in many respects, and extended observation obliges me to agree with their conclusions. In the first place, the ordinary chronic tuberculosis of cattle has nothing whatever in common with pulmonary phthisis in the human subject, except the presence of a bacillus which has the same chemical reaction to staining agents as the

tubercle bacillus of Koch. It has, however, many features similar to those in chronic tuberculosis in man, and also many marked differences.

On examining the lungs of a cow affected with tuberculosis the appearances presented under the microscope are those of reticular tubercle containing a large number of giant cells and also a number of large, so-called epithelioid cells; this reticular tissue is arranged round the margins of large caseous masses, which, in the majority of cases, has undergone calcification to a large extent. So far the disease resembles that found in the human lung, with the exception of the calcification, which, almost universally present in the bovine animal, is rare in the human. Another point, also, is the frequency with which large nodular masses are found in the pleura of cattle affected with this disease, which on examination are found to be composed of reticular tubercles. All these reticular tubercular formations consist of aggregations of small tubercles which appear to have grown and degenerated in a similar manner to that already described as occurring in the human subject.

So far the difference between the human and bovine disease is slight, and it is not until we treat sections of these lungs in a special manner to show the bacilli contained in them, that the difference becomes more marked. It is then seen that the bacillus itself differs in size from that found in human tuberculosis; it is much smaller. Klein (*Microörganisms and Disease*, 3d ed.) says they are nearly half, or at least one-third smaller. This may not seem an important point to many until they consider the extremely minute variations in shape and size which have been held, by some, to constitute a different species of microörganism and establish its connection with some form of disease.

The next point of difference is in the distribution of the bacilli, and here it is very marked. The bacilli are found principally in the giant cells and so-called epithelioid cells, and their arrangement in the giant cells is peculiar; they are arranged circularly round the periphery of each cell. The so-called epithelioid cells are packed full of them, and they can be found in clumps where these cells have broken down. I have before pointed out that bacilli are not found in the giant cells of tuberculosis in the human lung; at least, such is my experience and it is supported by other observers. We then have a difference in the bacillus itself morphologically and also in its distribution and relation to the component parts of the tubercular growth, from that of the bacillus found in the human lung, their only point of resemblance being their reaction to certain staining agents.

The next point to be considered is, Do they affect animals in a similar manner to those taken from human lungs when inoculated?

To settle this point I have made a large number of experiments both in feeding and inoculating animals with tubercular material obtained directly from the lungs of animals affected with tuberculosis.

The results I have obtained were the following. I will not give the experiments in detail, as they have been so numerous it would prove tedious.

The effect of the inoculation of guinea-pigs with bovine tubercular matter is to produce in them a general tuberculosis in which all organs are more or less affected. There are two points, however, worthy of notice.

I find throughout my P. M. notes of these cases, constantly occurring in the description of the microscopical appearances in the lungs and liver, the following remark: "The tubercular process seems to have commenced in the interlobular tissue and extended from it into the organ." Now this is exactly what I have found in many animals where this form of tuberculosis has occurred spontaneously, and it may have some significance. The second point is the freedom of the kidney from infection, and this applies to inoculation of human matter as well as bovine. I have never found the kidney affected except in those cases where pregnancy has allowed the disease to exist for a long time, months instead of weeks.

It must be understood that I am now speaking of the results of inoculation on guinea-pigs only.

In monkeys I have never seen the kidney affected from inoculation with human tubercular material from any source.

In inoculation experiments on rabbits with bovine tubercular material the results were very different. In every case a marked general tuberculosis was produced with large masses of caseation containing numerous bacilli. An important point in connection with these animals is this: in every case inoculated with bovine tubercular material the kidney shared the fate of the other organs and presented to the naked eye a surface studded with tubercular projections, which on examination proved to be caseous and full of bacilli.

There is still another point of difference between human and bovine tuberculosis which may have some significance in the further line of investigation we are carrying on, which will be the subject of future reports.

I have mentioned before the fact that after eighteen years in spirit the tubercle bacilli in the human lung still retain their characteristic reaction. In the cow's lung, hardened in the same manner, I have found that four or five years in spirit entirely removes this property and I cannot get any reaction from the bacilli. This, at any rate, is the case in several different specimens under observation.

I think from the foregoing facts it will be granted that the morphological difference in the bacilli and the marked difference shown by rabbits when inoculated with tubercular matter from these two diseases, justify us in considering that in the present state of our knowledge

they cannot be classed as the same, the only identical point being the reaction of the bacillus to staining agents.

Klein, in his work on *Microörganisms and Disease*, third edition, 1886, says, page 170:

"According to my own experience, extending over a very large number of cases of human miliary tuberculosis and tuberculosis in cattle, I cannot for a moment accept the statement that the bacilli found in the two affections are identical; for I find that in the two diseases their morphological characters and distribution are very different. The bacilli of human tuberculosis are conspicuously larger than those of the tuberculosis of cattle, and in many instances more regularly granular. . . . . The bacilli in the tuberculous deposits of cattle are always contained in the cells; the larger the cell the more numerous the bacilli."

Different Animals in which Bacilli have been Found Giving the Reaction of Koch's Tubercle Bacillus.

I have examined a number of animals that died with diseases of the lungs and other organs and have found in them bacilli that give the characteristic reaction of the tubercle bacilli, although the lesions in many cases differ from those found in either human or bovine tuberculosis; and it may help in some degree toward the elucidation of the problem we are working at to give an account of these cases.

Monkeys.—It is a commonly received idea that the quadrumana are very subject to tuberculosis. This is not the case; the majority of these animals that die in confinement are the subjects of bronchitis, bronchopneumonia, acute pneumonia, pulmonary phthisis, or pleurisy. In 1883 in conjunction with Mr. J. B. Sutton, I examined the lungs of a number of monkeys that died at the Zoölogical Gardens, and out of this large number only five were considered tuberculous. At that time I made the diagnosis of tuberculosis more from the presence of tubercle bacilli than from the actual microscopical appearances; extended observation since has made me very doubtful if a *bona fide* case of reticular tubercle ever occurs in any of the quadrumana. I have had several of these animals that have died from general tuberculosis as it appeared to the naked eye, cases where tubercles existed in every organ, where the omentum and mesentery were filled by them and immensely thickened, but careful examination has shown that in every one of these cases there was no reticular formation, only caseous degeneration of inflammatory products, and in this degeneration were large numbers of bacilli giving the reaction of Koch's tubercle bacillus.

It is impossible to tell what these cases really are without a microscopical examination. I have lately examined the lungs of a monkey that had to the naked eye every appearance of tuberculosis. On hardening them, however, all these apparent tubercles had disappeared, and on making sections I found they were caused by a localized emphysema

brought on by minute emboli. In a paper read by me at the Pathological Society of London, January 15, 1884, I described a similar case occurring in a Beatrix antelope.

CARNIVORA (*Viverridæ, Felidæ*).—Amongst the animals belonging to these groups examined were felis eyra, paradoxure, civet cat.

They had been fed on birds that were supposed to have died of tuberculosis. The changes found were in the liver, a portion of the organ had undergone caseation seemingly after some inflammatory condition; there was no appearance of reticular formation, and bacilli giving the tubercular reaction were found in the caseated portions.

URSIDÆ (*Coatimondi, Bears*).—These are the only animals, other than ruminants, I have examined where there was any resemblance in the morbid process to that seen in bovine tuberculosis. In the lungs there were large masses of changed substance which consisted of a fibroid tissue with, in some cases, giant cells and numbers of the so-called epithelioid cells. These latter contained many tubercle bacilli. One bear had nodular growths in the pleuræ.

CAMEL.—I have examined the lungs of a camel supposed to be tuberculous. The case, however, was one of acute pneumonia the consolidation of which had not undergone resolution but had remained in patches throughout the lungs. The outline of the air-vesicles could be clearly made out in the consolidated portions. Tubercle bacilli were so numerous in these parts that they were easily visible with the naked eye as red patches, principally at the edges of the affected parts.

BIRDS.—I have examined a large number of birds that were considered to be the subjects of avian tuberculosis, amongst others the domestic fowl, turkey, grouse, golden pheasant, South American ostrich, emeu. The appearances presented by the organs of these varied exceedingly, and I shall have to separate the rhea or South American ostrich and the emeu from the others. The first specimen I received was the liver of a rhea sent me by Mr. J. B. Sutton. On making sections and staining them with logwood I found circumscribed areas surrounded by fibrous tissue containing a number of cells; these areas varied greatly in size and the larger ones had the centre filled with disintegrated cells. Outside these areas the liver structure was normal. On staining them for tubercle bacilli I found that these areas were made up of cells filled with bacilli giving the reaction of those found in phthisis. In the larger areas the cells had broken down and the bacilli were loose amongst the débris. Between the affected parts a few cells could be seen containing the bacilli, but the majority were perfectly normal.

Dr. Klein made a drawing from one of my specimens of this liver for his work on *Microörganisms and Disease*, and considers it to be leprosy. This to anyone who has worked on leprous tissue is manifestly wrong.

Since then I have examined the organs of two rhea and some emeu and have found in them the same appearances, but in these cases I was able to examine all the organs: the result showed that everywhere the relation of the bacillus to the tissue was the same; in the thyroid, the intestine, liver, etc., the various cells were full of bacilli in places, but they had exerted no influence on the surrounding cells, and only in exceptional cases had the irritation been sufficient to set up new fibrous formation round the affected cells. In the intestine, the appearance of the columnar epithelial cells crowded with these bacilli was very peculiar. In the grouse and pheasant (golden) the changes were very different; here the liver was the organ affected, and on staining sections with logwood here and there patches of large cells were seen: these patches were composed of cells that stained very differently both with logwood and methylene blue; those in the periphery took the stain well and showed one or more well-developed nuclei, while those toward and in the centre stained faintly or not at all.

For a long time I was puzzled to account for the origin of these cells, but after carefully examining a large number of sections from various cases, I was able to satisfy myself that they were simply liver cells that had become hypertrophied. On staining sections with special stains I found that those cells which had taken the logwood or blue stain well, contained no bacilli, while those that had stained faintly or not at all with logwood or blue, showed with the special stain several red bacilli, resembling the tubercle bacillus. That is, the normal cells contained no tubercle bacilli, only those that were undergoing degeneration. It was an interesting question as to where these seed-eating birds had obtained the infection and I made many careful investigations of their food and surroundings, the earth in their runs and the worms contained in the earth, to see if any bacilli were present, but I could find none in any way resembling the tubercle bacillus.

I have frequently found caseous masses in the liver of the domestic fowl which contained large numbers of bacilli staining similarly to the tubercle bacillus and resembling it somewhat in shape and size.

Snakes.—I have examined the livers of several large snakes, such as boas and python, which had died of disease presumably from having been fed on tuberculous birds.

The appearances presented were somewhat similar to those found in the rhea and emeu; that is, the liver cells in certain patches were full of bacilli giving the characteristic reaction, and some of the larger of these patches were surrounded by a small amount of fibrous tissue evidently formed by the irritation set up. All the intermediary portions of the liver appeared to be normal. The majority of these cases I received from Mr. J. B. Sutton, whose numerous papers on comparative pathology

published in the *Transactions of the Pathological Society of London* are very valuable. I have also obtained several cases from sources in this country and England, but the supply is much too small for extended work.

VI.

Conclusions Drawn from the First Portion of the Investigation.

By Drs. Gibbes and Shurly.

We wish now to point out the deductions we have made from our investigations so far, and later on we shall give the results of a number of experiments now in progress, but which will take a considerable time before we can get reliable data from them.

We consider that tuberculosis and phthisis pulmonalis cannot be classed as the same disease clinically, and in this opinion we are undoubtedly upheld by the majority of men having large clinical experience; we also consider that the appearances presented by the lesions in the lungs after death are so different in these two diseases, that they are even more widely separated pathologically than clinically.

It seems to us, then, that the position held by the bacillary theorists may be summed up in this way: To use an optical simile, rays coming from points as widely separated as tuberculosis, phthisis pulmonalis, lupus, bovine tuberculosis, scrofula, converge and come to a focus at a point, the bacillus tuberculosis. Here they immediately diverge, and when they have proceeded far enough—that is, to the post-mortem examination, they are found to be of different kinds, but each has its own identity. Our observations lead us to doubt whether all these rays do pass through the same focal point.

We would suggest the following classification of diseases of the lungs in which consolidation occurs:

Acute Miliary Tuberculosis.—Of two kinds, differing clinically only in the occurrence in one kind of typhoid symptoms, causing it often to be mistaken for enteric fever. Differing, however, *in toto* in the morbid histology, the one form being genuine tubercle, the other a collection of numerous small foci of inflammatory action.

Differing also in the distribution of Koch's tubercle bacilli, which in the latter form are always found in large numbers, but in the former are often absent and never numerous.

General Tuberculosis.—The clinical features varying according to the chronicity of the disease, but sufficient to a careful observer to distinguish it from phthisis pulmonalis, and never following broncho-pneu-

monia. Differing in its morbid histology, in that the consolidation is always formed by new growth, and not by inflammatory action, this new growth being characterized by its proneness to break down and disintegrate, thus forming cavities; enough of the new growth, however, always being left in the wall of the cavity to determine its tuberculous character.

Differing also from phthisis pulmonalis, in that many cases, even with large cavities, have been proved to be free from tubercle bacilli.

PHTHISIS PULMONALIS.—An inflammatory disease of the lungs, distinguished by rapid consolidation, which, however, may clear up if the process has not gone far enough to damage irretrievably the lung substance, and notable for the frequency with which it follows bronchopneumonia. Differing from tuberculosis in that there is no formation whatever of new tissue; from beginning to end the process is one of inflammatory exudation, breaking down, or caseation, ending in the formation of cavities. Differing also from tuberculosis in the regularity with which tubercle bacilli are found in this disease, and their enormous numbers in the most acute forms.

CHRONIC OR FIBROID PHTHISIS.—This from the beginning is a chronic change acting on the fibrous or interstitial tissue of the lungs. It may follow from many causes, such as the inhalation of irritating particles, or the presence in the lung of a consolidation, such as that of croupous pneumonia, which has not undergone resolution. Arising from such various causes, the clinical features will vary accordingly. The pathological change, however, is always the same, an increased growth of fibrous tissue which contracts, and in so doing damages the lung substance. Inflammatory action may, however, take place in a lung the subject of fibrous change which may be followed by caseation, and in this way the discrepancies in the accounts as to the relation of the tubercle bacillus to this disease may be accounted for.

The above classification is suggested, and will, we think, bear more minute investigation. It is, in fact, the classification of the older writers, which has been set aside by the discovery of Koch's tubercle bacillus, and we contend that this discovery is not sufficient, and cannot sustain the sweeping change that has recently been made in the views of many regarding these lung diseases. Koch himself laid down some axioms as necessary to be filfilled before a given microörganism could be accepted as the virus of a given disease. They are, as stated by Dr. Pye-Smith in the second edition of Fagge's *Practice of Medicine:*

1. The malady must have such distinct and constant features, whether *clinical or anatomical,* as shall enable it to be identified.

2. The microörganism must be itself distinguishable from all others by its size and shape, its staining properties, but above all by its mode

of propagation in a pure cultivation (*i. e.*, artificial separation from other organisms), and by the form, color, and general appearance of the colonies it produces, and its mode of growth, both in plate cultivation, in tubes, and in drop cultures.

3. The organism thus identified must occur in the blood or tissues, not merely on the surface (cutaneous or intestinal), but below the epithelium, in the lymph-spaces or bloodvessels, *in every case of the disease in question.*

4. It must not occur in the human body, except in cases of the particular disease in question.

It may, however, conceivably occur in other animals without giving rise to the same pathological symptoms, or in air or water—as of course it does occur in the test-tubes and plates of "pure cultivations."

5. When a pure cultivation of the organism is introduced into the blood and tissues of an animal, the *phenomena* (*clinical and anatomical*) of the disease in question must be reproduced.

6. From that animal a "pure cultivation" must be again capable of reproduction, from which another animal may be again infected, and so on.

Now, taking the first canon, we would ask, Are the clinical and anatomical features distinct and constant? We have given data enough to show that they are not. Dr. Klein, in his description of the lesions in acute miliary tuberculosis, marks the sharp distinction into two forms.

And yet we have Germain-Sée, in his work on *Bacillary Phthisis*, making the following statements:

"1. The unity of phthisis, comprising all *acute* and *chronic* manifestations. There exists no dualism between tubercle and caseous pneumonia; no distinction between tubercular phthisis and inflammatory phthisis."

"2. Analogy, even identity, of tubercular nodule with inflammatory nodule from the histological point of view."

This is exact science with a vengeance.

Professor Hamilton, in his work on *The Pathology of Bronchitis*, speaks of disseminated catarrhal pneumonia. He says:

"The most curious point about these deposits is that they have not the slightest tubercular structure, but in all respects are identical with what is seen in the second stage of catarrhal pneumonia; they are small isolated groups of air-vesicles filled with epithelial products, the group invariably caseating in the centre. Every one has exactly the same appearance; there is not a vestige of any giant-cell structure; there is nothing of an interstitial character in the nodules. The whole process is one of catarrhal accumulation in the air-sacs, followed by necrosis of the mass; and the only difference between this and ordinary catarrhal pneumonia is in the fact of the nodules being small in size and isolated in character, and universally disseminated throughout the lung substance."

We have pointed out that these nodules always contain numbers of tubercle bacilli.

In speaking of Koch's axioms, Dr. Pye-Smith (*loc. cit.*) says:

"The microörganism of tubercle is believed to be constant, specific, and pathogenic, but its relation to much of what is clinically and anatomically called tubercle in man is not fully established. Here the first of the above conditions is wanting."

Here, then, at the outset we find the tubercle bacillus not filling the first of the conditions established by its discoverer as essential to its position as the virus of the disease.

Secondly, if we take the question of size, the bacillus tuberculosis is at once separated from that found in bovine tuberculosis, although the reaction to staining agents is the same.

Next, in its staining properties it is not distinguishable from the lepra bacillus, from the numerous bacilli found in birds and other animals, the account of which has been already given, or from a form of micrococcus isolated by one of us from urine. These cannot be tubercle bacilli, as they do not produce the disease in the animals in which they are found. We shall have something to say on the mode of growth in cultivations later on.

Thirdly, this canon is not fulfilled by Koch's tubercle bacillus, as Koch himself has recorded cases where the disease existed and no bacilli could be found. We have shown that such has also been our experience in a number of cases.

Fourthly, to answer this canon the particular disease must be accurately defined.

Fifthly, we have proved that the induced disease by inoculation in the lower animals has no features similar either to reticular tubercle or caseous phthisis.

We have then a microörganism which is considered by many to be firmly established as the virus of a disease, to establish which connection its discoverer has laid down a set of rigid laws, and we find that this microörganism does not fill the conditions of any one of these laws.

It may be asked how has the microörganism arrived at this anomalous position? The answer is simple. This solution of the tubercular problem took a vivid hold on the imaginations of many men, the majority of whom had no special training for histological or pathological work. It was carried by acclamation, and any questioning of its position was received as little short of blasphemy. Even at the present day there are some men who seem to consider it a personal insult to them to doubt the infallibility of the tubercle bacillus. We have, however, been working for a number of years on this question, and we wish to bring before the medical profession our views founded on actual

practical work, and we feel sure of fair criticism from those men who are capable of looking at both sides of a question.

These diseases of the lungs cause such misery and such a large percentage of deaths that any addition to our knowledge of their causation can only act beneficially on the human race. When we see the divided opinions concerning these diseases held by our best men, we cannot but feel that the end is not reached yet, and when we consider the enormous amount of work that has been done in bacteriology generally, and especially in connection with tuberculosis, in the last ten years, we stand appalled at the very slight (if any) benefit we have derived from it. In our treatment of these diseases we cannot but think that the investigations have been made in the wrong direction. To think that men should be content to consider the virus of a disease found, and yet to remain without any further means of combating that disease after this discovery, would be an impossibility, and this is proved by the immense number of remedial measures brought forward, all to be faithfully tried, and all to fail.

We cannot help thinking that the chemical side of the question has been almost entirely neglected. What have the chemists told us about caseation; of what is it composed; and is it in all cases an identical chemical substance? This is a most important question, and one that ought to be fully worked out. It would then be shown whether the substance produced by the disintegration of reticular tubercular formation is identical with that found after the breaking down of consolidation following broncho-pneumonia. It is nonsense to assert that these are the same, and that they are caused by a specific microörganism we want chemical proof.

We have lately had a case which was diagnosed during life as phthisis. There was a large amount of consolidation ending in the formation of cavities. A number of guinea-pigs were inoculated with sputum from this case, and the bacilli were so numerous that it was used for practical class demonstration. At the post-mortem examination there were the usual appearances of phthisis pulmonalis, yet the microscope revealed the fact that the case was one of croupous pneumonia, the consolidation of which had not undergone resolution. Not one of the guinea-pigs inoculated developed the so-called tuberculosis. They all had large abscesses at the seat of inoculation, containing fluid pus, with numbers of tubercle bacilli, but in no case were the lungs affected. In one case there were some abscesses in the liver and spleen, and one guinea-pig is still living, seemingly unaffected, the inoculation abscess having healed. Whatever may be the true explanation of this case, the fact remains that sputum taken from a case where the lung is rapidly breaking down after croupous pneumonia, and which sputum was loaded with bacilli, did not produce the lesions in the guinea-pig that

we may confidently look for when using sputum from a case of phthisis pulmonalis.

We think that if the fact were universally admitted that cavities in the lungs were formed by two distinct methods we should be better able to treat these diseases—as one form that of the inflammatory kind, is distinctly amenable to treatment if taken early enough, and if the lesions in these inflammatory cases were recognized at an early stage we are confident that more cures of cases of phthisis would be recorded, although the tendency of the present time is certainly in that direction.

With regard to tuberculosis proper it is probably an incurable disease, as is cancer, when occurring in an internal organ; at any rate, in the present state of our knowledge of these diseases, associated with the formation of new and alien tissue.

It may be thought that we should express some opinion as to the part the bacillus tuberculosis plays in these diseases. Here we are met by a difficulty. It seems beyond a doubt that this microörganism is intimately associated with caseation, and we know that it is never absent from that degeneration when it follows phthisis pulmonalis; but we also find it in degeneration of tubercular new-growth. Now, the question arises, Are these the same bacilli?

We have shown that in bovine tuberculosis the bacillus has the same chemical reaction as that of Koch, and yet it is much smaller. We know from careful and repeated observations that the bacillus varies in size considerably in various cases of phthisis; more especially is this noticeable in cases of acute phthisis or galloping consumption. Here the bacilli are large, long, and contain numbers of so-called spores. In other cases the bacilli are much smaller and shorter. Another point we have observed is, that in scrofulous glands removed from the neck and placed in spirit, after some years the bacilli lose their power of reacting to the specific staining agent, and before this power is quite gone—that is when they have not been so long in spirit—they will stain fairly well, but the reaction completely disappears in twenty-four hours, although bacilli in sections of lungs kept many years in spirit took the same stain well and still retain it. We have already pointed out this peculiarity in the bacilli of bovine tuberculosis. There are several cases on record where the mesenteric glands have been found after death changed into masses of calcification. This is what we have already pointed out as occurring so often in bovine tuberculosis. We have a number of cases in which tabes mesenterica was directly traced to the ingestion of cow's milk.

Is it possible that tuberculosis, as we understand it, has any distinct relation to bovine tuberculosis, through infection from the milk of a tuberculous cow? This has occurred to us as a possibility, and as such

we bring it to the notice of the profession. We should then have two forms of tubercle bacilli, the one derived from an outer source, and producing tuberculosis, either directly or through some poisonous product, this might take place in a gland or other part. This gland, becoming caseous first, would after a time infect the whole organism, and this infection would take varied forms, according to the situation of the part first infected, and its means of communication with the rest of the body. The other, a bacillus having a similar chemical reaction to the first, but associated in some way with caseation. It cannot be the cause of the disease here, as we find it in cases where we have bronchitis extending into the lungs, and causing broncho-pneumonia, the consolidation so formed not clearing up, but breaking down, and containing numerous bacilli with specific reaction. To explain it by the theory that there is a specific and a non-specific broncho-pneumonia seems to us to be a very lame way out of a difficulty. We do not give this idea as mere theory, but we have some facts which have induced us to consider the matter, and we are carrying on a series of investigations on these lines. There may be nothing in it, but we would ask the kind consideration of those men who are not wedded to the unity of phthisis on this point.

As to heredity and contagion our work is still in progress, and it will take a much longer time than we have yet devoted to these questions before we can get reliable data to work on. In the meantime we would say that the results we have laid before the profession are those of honest work, and all we ask is fair and open criticism of this work by those competent to do so.

SALOL IN ACUTE TONSILLITIS AND PHARYNGITIS.[1]

By Jonathan Wright, M.D.,
of Brooklyn, N. Y.

The majority of our most efficient drugs are used empirically. We all know what mercury does for syphilis and what quinine does for malaria. Our great ignorance of chemical and biological changes compels us to reason directly from sequence to antecedent. The results which follow the administration of some drugs are so constant and so direct that we hardly appreciate the gap in our real knowledge of their *modus operandi*. The testimony in regard to them is too overwhelming for us to doubt for a moment their being the causes of the results which follow their use.

[1] Presented and accepted as a candidate's thesis for membership in the American Laryngological Association, May, 1890.

When we reach a slightly lower grade in the pharmacopœial list—iron, arsenic, salicylic acid, the phosphates—it behooves us to draw our conclusions in regard to cause and effect with greater caution in any given case.

Everyone recognizes that certain diseases, such as pneumonia, diphtheria, and typhoid fever, often result in recovery or death irrespective of any plan of treatment whatever. Certain more chronic and more usually fatal diseases, such as phthisis, chronic nephritis, and diabetes, often have their periods of temporary improvement and depression without, as well as with, treatment. The effects of therapeutic measures in all such affections are to be judged with great reserve, and they necessitate the collection and careful analysis of a large amount of clinical experience.

This is still more eminently so of simple acute tonsillar or pharyngeal inflammations, which, almost without exception, end in recovery and are self-limiting diseases. The duration of the subjective symptoms, which are our principal and the patient's sole concern, varies so much that conclusions drawn from the effects of any plan of treatment in a limited number of cases are apt to be extremely fallacious. General impressions made upon the observer are still more so, depending as they do upon individual power of observation and upon the strength of his imagination. Owing to these considerations, it was with a good deal of scepticism that I read the article of Gouguenheim[1] in which he spoke so enthusiastically of the treatment of acute inflammations of the pharynx by the internal administration of salol. He quotes Dr. Capart, of Brussels, as speaking of its "almost miraculous action." He reported twenty-two cases, and his claims were so strong of its power in relieving dysphagia in these annoying and very common affections that, recommended by such an authority, it seemed worthy of a trial. The results which I have obtained form the excuse for this paper.

Max Thorner, of Cincinnati, has given the best and fullest account[2] of salol in this country, and was the first, as far as I know, to give it internally for throat affections. It may, nevertheless, not be superfluous to give a brief synopsis of its nature, and of its physiological and therapeutical action, as spoken of by him and others.

It was discovered by Nencki, a Swiss chemist, in 1883, and first used by Sahli[3] in 1886. It is a colorless substance, sold in the shops as a coarse white crystalline powder. It has a marked aromatic odor, and a faint taste, which is rather agreeable than otherwise. Chemically it consists of salicylic acid in which one atom of hydrogen has been re-

[1] Annales des Mal. de l'oreille, etc., No. 9, 1889.
[2] Cincinnati Lancet Clinic, Dec. 10, 1887.
[3] Correspbl. f. Schw. Aertzle, Nos. 12 and 13, 1886.

placed by the phenol group, and contains synthetically forty per cent. of the latter and sixty per cent. of the former. It is a proprietary article, made abroad, and usually sells at four dollars a pound.

It is insoluble in water, but, like the fats, is soluble in alcohol and ether, and is decomposed by sodium bicarbonate.[1] Hence it should not be given in combination with the latter. It forms emulsions easily. Though crystalline in structure, it cannot be reduced to a fine powder, on account of the tendency of its particles to cohere. It has a low melting point (43° C.).

It is insoluble in the gastric juice, but is readily dissolved in the pancreatic and intestinal secretions, where it is separated into its primary constituents, both of which are readily absorbed and appear in the urine, giving it the olive-green color caused by carbolic acid. In thirty-grain doses it is a powerful antipyretic, but in smaller and frequently repeated doses (five grains every hour) it is not so efficient in this regard.[2] Its odor is very distinctly appreciated in the secretions and in the expired air.

The unique characteristic of salol in being able to pass the gastric juice unchanged, while in the intestines it is decomposed into phenol and salicylic acid, both being antiseptics, has been taken advantage of in treating the summer diarrhœas of children. The rapidity with which these drugs are absorbed and the promptness with which they appear in the urine have made it valuable in treating cystitis, pyelitis, and gonorrhœa.

Attempts have been made, with doubtful degrees of success, to diagnose motor insufficiency of the stomach by noting the time required for its appearance in the urine as phenol after administration. This varies within such comparatively wide limits normally (thirty to ninety minutes) that it has not proved of much service for diagnostic purposes. It has been used locally as a dry dressing, and as a mouth and nose wash, dissolved in alcohol and mixed with water, but with very moderate results. It has been used as an antipyretic successfully. But its principal use has been as a substitute for the compounds of salicylic acid in the treatment of rheumatism.

Its advantage over the former, it is claimed, consists in its agreeing better with the stomach and in its not producing the disagreeable head symptoms noticed in large doses of salicylic acid. The former assertion I think, from my own experience, true, but I have noticed occasionally tinnitus aurium and headache in doses of two drachms daily. This being equivalent in salicylic acid to about seventy grains, does not show any very great advantage over that drug. Like salicylic

[1] Nencki: Therap. Monatsheft, Nov. 1887.
[2] Georgi: Berl. klin. Woch., Feb. 28, 1887.

acid—perhaps more often—it utterly fails, in rare cases, to have any effect on rheumatism whatever. There seems to be evidence to show that its analgesic effect is more pronounced in rheumatism than the salicylates. Rosenberg[1] says that pain disappears as a rule in twenty-four to forty-eight hours, and never later than five days.

Bartholow[2] says: "The effects of salicylic acid are increased in all directions by members of the phenol group." This probably explains why ninety grains of salol will do more work in rheumatism than the fifty grains of salicylic acid which it contains. Nencki[3] has lately recommended the salicylate of creosol for internal use rather than salol (salicylate of phenol), on account of its being less liable to cause disagreeable symptoms. Ninety grains of salol daily are sufficient for throat inflammations, and this dose rarely, if ever, causes any head symptoms. Three drachms daily are mentioned as the maximum dose, but I have never given over two. It has proved of service in sciatica and lumbago.

The observations on its effects in allaying the pain in rheumatism are interesting in a consideration of its action on the dysphagia of acute throat affections, the time in which it is said to relieve the pain—twenty-four to forty-eight hours—corresponding very closely to my experience. Its occasional entire failure is also noted in both cases. The carboluria, which is always present, is the only sign of any phenol poisoning that is noticed, and need consequently give rise to no apprehensions.

In its administration I have never given less than sixty grains daily, nor more than one hundred and twenty, the most frequent dose having been ninety grains for adults. It may be given in powder form or as an emulsion. The most efficient method is to give it in ten-grain doses every two hours during the day. Wyeth & Brother, of Philadelphia, made a lozenge for me containing five grains of salol with some licorice and sugar which may be found of value, but I have no faith in its local action whatever, both from theoretical reasons and from practical experience, its insolubility being sufficient to explain its lack of power in this regard.

I have noticed the most marked effect in lacunar tonsillitis, less in catarrhal pharyngitis, and least in a well-developed quinsy. For the latter, hot fomentations and free incision are the best remedies, though salol may be given as an adjuvant. This, of course, only applies to cases after the fourth day, before that time the greatest relief being often obtainable by the use of the drug.

We know that the pain in any form of simple acute tonsillitis or pharyngitis is apt to disappear after the third day under any plan of

[1] Therap. Monatsheft, 1887, p. 51.
[2] Materia Medica and Therapeutics, 1887, p. 335.
[3] Ref. Centrbl. f. Bact., No. 12, 1890, p. 386.

treatment. This is eminently true of the catarrhal and lacunar forms. When the inflammation, however, extends deeper and involves the parenchyma and peritonsillar tissue, the duration is sure to be longer. One form may, of course, merge into the other, they being usually only different degrees of the same disease. In considering their treatment, it is therefore manifestly misleading to class all cases together, whether treatment has begun upon the first, second, or third day. Like all diseases, the younger the patient, the quicker does he respond to treatment.

In preparing the accompanying tables I have divided the cases into three classes: those in whom treatment was begun on or before the second day, those beginning during the third day, and, lastly, those beginning treatment on the fourth or later days. I have based my calculations on the patients' statements in regard to the pain, that being the most striking and interesting phenomenon to them. My material is principally drawn from the case-books of my clinics at the Roosevelt and Demilt dispensaries in New York, from November, 1889, to May, 1890. I am indebted to my friend, Dr. J. E. Newcomb, for the data of several cases coming under his observation elsewhere.

TABLE I.—CASES IN WHICH TREATMENT WAS BEGUN ON OR BEFORE THE SECOND DAY OF THE DISEASE.

Case.	Sex.	Age.	Diagnosis.	Day of disease.	Relief from pain (hours).	
1	F.	40	Lacunar tonsillitis.	Second	24	
2	M.	24	" "	Second	18	
3	M.	18	" "	First	12	
4	M.	7	" "	First	24	
5	F.	26	" "	Second	24	
6	F.	40	" "	Second	12	
7	F.	9	" "	Second	24	
8	?	?	" "	First	12	
9	F.	13	" "	First	24	
10	?	?	?	Second	None	No relief; records defective.
11	F.	27	Lacunar tonsillitis.	Second	18	
12	F.	17	" "	Second	6	
13	M.	20	Parenchymatous tonsillitis.	Second	None	Pain grew steadily worse; 1 drachm given.
14	F.	28	Catarrhal pharyngitis.	Second	30	Also coryza.
15	F.	23	Lacunar tonsillitis.	First	4	Atrophic rhinitis.
16	M.	22	" "	Second	4	Swelling increased when next seen; two days later no pain.
17	F.	18	Catarrhal pharyngitis.	Second	24	
18	F.	24	" "	Second	12	Partial.
19	F.	21	Lacunar tonsillitis.	First	24	
20	M.	25	" "	Second	6	Supervened on uvulotomy: pain in uvula not relieved with the dysphagia from the tonsillitis.
21	F.	26	Parenchymatous tonsillitis.	Second	36	
			Average		17+	

TABLE II.—CASES IN WHICH TREATMENT WAS BEGUN ON THE THIRD DAY OF THE DISEASE.

Case.	Sex.	Age.	Diagnosis.	Day of disease.	Relief from pain (hours	
1	M.	19	Lacunar tonsillitis.	Third	28	
2	M.	22	Quinsy.	"	...	No relief from pain.
3	M.	19	Catarrhal pharyngitis.	"	48	
4	F.	18	Lacunar tonsillitis.	"	24	
5	F.	23	Quinsy?	"	24	
6	F.	30	Lacunar tonsillitis.	"	24	
7	M.	12	" "	"	24	
8	F.	13	" "	"	24	
9	F.	9	" "	"	24	
10	F.	18	Quinsy.	"	None	No relief from pain.
11	M.	17	Lacunar tonsillitis.	"	24	Cure in five days.
12	F.	25	" "	"	12	xxx grain doses produced anorexia.
13	F.	19	" "	"	24	
14	M.	24	" "	"	24	
			Average		27	

TABLE III.—CASES IN WHICH TREATMENT WAS BEGUN AFTER THE THIRD DAY OF THE DISEASE.

Case.	Sex.	Age.	Diagnosis.	Day of disease.	Relief from pain (hours).	
1	F.	11	Lacunar tonsillitis.	Sixth	24	Well in four days.
2	M.	16	" "	Fifth	28	
3	M.	21	Quinsy.	Seventh	24	
4	F.	28	Catarrhal pharyngitis.	Fourth	24	
5	F.	24	Lacunar tonsillitis.	Fourth	24	Colored patient.
6	F.	3[illegible]	Acute catarrhal pharyngitis and laryngitis.	Seventh	6	Patient's hoarseness also relieved.
7	M.	19	Quinsy.	Fourth	24	
8	M.	13	Lacunar tonsillitis.	Tenth	36	
9	F.	19	" "	Fifth	3	
10	F.	38	Catarrhal pharyngitis.	Eighth	12	
11	M.	28	Quinsy?	Fourth	48	
12	F.	19	Lacunar tonsillitis.	Fifth	3	
13	F.	20	Catarrhal pharyngitis.	Fifth	24	Patient had pain in bones (spec.?) at night, which was not relieved.
14	M.	36	" "	Fifth	36	Phthisis case.
15	M.	40	Quinsy	Fourth	24	
			Average		24	

Depending so entirely upon the statement of the patient as is necessary where reference is made to subjective symptoms, a great deal has to be allowed for his individual idiosyncrasies. Some patients, and they are not rare, among the dispensary class only admit relief from suffering with great reluctance. Others, and everyone will admit they are fewer, take a more optimistic view of every remedial agent than the facts warrant. However, in as large a number as I have here reported such errors, to some extent, will correct themselves in the average.

In recording the answers of the patients in regard to the pain, care

has been taken to ascertain that the relief after the time noted was marked. In doubtful answers the time recorded was lengthened rather than shortened. Therefore it must be understood that all the figures are rather approximate than literal. The relief from the pain coincided in nearly all cases with the relief of the constitutional symptoms, but, strange to say, and the same remark has been made by Gouguenheim, the subsidence of the pain was often complete before the swelling or congestion had appreciably diminished. Indeed, in a few cases of parenchymatous inflammation, and in one case of peritonsillar suppuration, I have seen the swelling increase after almost entire abolition of the pain. I am unable to account for this, but the fact is incontestable. In lacunar tonsillitis, however, the disappearance of the little mucous plugs from the lacunæ was more synchronous with the abolition of the pain.

Thorner has laid great stress upon a rheumatic history in these cases. A complete previous and family history is taken, as a matter of routine, of every case in my dispensary classes, and the question of a rheumatic history is always looked into. I have never been able to convince myself that a previous or a family history of rheumatism was any more frequent in the mild acute inflammations of the throat than coincidence would account for. In the severer forms of quinsy and parenchymatous tonsillitis there is an undoubted preponderance. I believe many of the cases of lacunar and catarrhal pharyngitis reported here would, without treatment, have gone on in their later stages to parenchymatous or peritonsillar inflammation.

It will be noted that those cases, 21 in all, where treatment was begun in the first 48 hours, obtained relief, on the average, in 17 hours, the shortest being 4 hours and the longest 36 hours, while 2 received no benefit, the record as to the diagnosis in one of them being incomplete.

The second class of cases, those in whom treatment was begun on the third day, received benefit, if any, in 27 hours on the average. Two also, in this division of 14, received no appreciable benefit, both having had quinsy. The shortest time was 12 hours, the longest 48 hours, in receiving benefit.

The third division, 15 in all, obtained relief in 24 hours on the average.

It will be seen that those beginning treatment after the third day recovered more quickly, on the average, than those in the second division. This was because, no doubt, many were already improving when treatment was begun. Indeed, the last two divisions are of value principally as a means of comparison with the first, to which, of course, the greater value is to be attached, leaving everyone, according to his own convictions, to judge of the results in the other cases.

The cases recorded are all those which occurred under my own observation, or that of Dr. Newcomb, in whom the results could be

learned. None were excluded who, I was at all sure, had taken the medicine, excepting a few who were too stupid to give intelligible answers. Besides the cases recorded, I have probably given it in as many more, from whom nothing could be learned, as they did not return a second time. It is fair to presume that these cases also received the average benefit, or they would have reappeared.

I have previously used extensively salicylate and bicarbonate of sodium both internally and locally. I have used the combination of chlorate of potash with tr. ferri chlor. in many cases. In a few cases I have used the benzoate of sodium. Occasionally I have only given astringent and chloral hydrate gargles. In all methods of treatment, of course, the bowels were kept open with salines or calomel. My experience with guaiac is not sufficient to allow me to judge personally of its merits. As far as my observation goes, I should rank it after salicylate of sodium. Many claim it to be a specific, but its intensely disagreeable taste and its irritating effect on the stomach, and, in my hands, its uncertain action, make it in many respects an objectionable drug. Of course, my results from other methods have not been tabulated with care, but none of them have ever been so favorable as those indicated in these tables. Occasionally, as before said, salol fails utterly, but in a small proportion of cases.

In conclusion, I cannot do better than translate Gouguenheim's summary, with which I fully agree:

1. Salol acts beneficially in acute anginas of whatever cause.
2. It quiets the pain and dysphagia with the greatest rapidity.
3. In quieting the pain it may shorten the duration of quinsy.
4. It lowers the temperature.
5. In nearly all cases it diminishes the duration of the angina.
6. In order to attain those results, the dose should not be less than four grammes (sixty grains) daily.

A CASE OF SPINA BIFIDA; OPERATION BY EXCISION; RECOVERY.

By J. C. Cockburn, M.D. (Harvard),
of Minneapolis, Minn.

R. H. Male. Born September 11, 1889, of Scotch parents. Weight at birth, seven pounds. Both parents healthy, and of healthy families. No deficient development in any relative, on either paternal or maternal side, except in a sister of the child's father, who, after having had scarlet fever when five years old, failed to develop greater size than a child of eight or ten years of age. This aunt is said to have been of good form, active, and apparently to have enjoyed good health until she reached the age of puberty.

At this period, instead of developing into womanhood, she began to fail in health, and continued to do so until, at the age of twenty-five years, she died, never having menstruated. In this family, besides this babe, there were one boy and three girls, ranging from two to nine years of age, all in good health, and well developed. When the mother was about three months advanced in this pregnancy she slipped; falling backward, the lumbo-sacral portion of the back came forcibly in contact with a board in the pathway. For a week or ten days following this she experienced a peculiar sensation within the pelvis, and directly beneath the seat of injury, to use her own expression, she felt as if a big lump had swollen upon the inside of her backbone, about where she was hurt by the fall. This sensation gradually passed away, and gestation went on without further incident to full term.

In confinement was attended by a midwife, and the labor was reported as normal.

The parents state that the babe was healthy, vigorous, and well developed at birth, except that over the sacrum was a soft tumor, resembling in shape and size the larger half or end of a hen's egg.

On November 12, 1889, I first saw the case, in consultation with Dr. T. H. Monahan. I found a healthy-looking, well-nourished babe, in size up to the average of infants of its age, and correspondingly bright and active. The tumor had attained a circumference of eight inches, was quite translucent over nearly its whole outer surface, and the skin covering it was, to appearance, thin, tightly stretched, red and shining, and about to ulcerate or rupture.

This tumor was but slightly reducible, and pressure on it elicited none of the nervous symptoms which are produced by pressure, such as muscular twitching, convulsive movements, drowsiness, nor had the parents ever noticed any of these symptoms, only a cry, or moan of pain, or distress, when pressed upon.

The vigor and physical condition of the child gave promise of a favorable result from an operation, and I so advised.

To the parents were explained the almost inevitably fatal result of the case if left to itself; the great chance of death occurring during the operation, or quickly following it; and the reasonable chance of saving the life of the babe by operating. Grasping the situation at once, they readily agreed to and urged the operation.

Two days later, November 14, at 10 o'clock, A. M., assisted by Drs. Monahan and Tupper, I removed the tumor.

The operation was done aseptically. The little patient was put uuder chloroform, and then ether was administered carefully during the operation. Beginning at the superior portion of the tumor, an elliptical incision was made around it, keeping well back into the healthy skin, the inferior extremity of the incision coming well into the fissure of the nates. The dissection was slowly and carefully made down to the spinal column, which was readily reached, except at the inferior portion, where a dense fibrous band or mass connected the tumor to the sacrum.

The opening in the spinal canal being reached, on all sides the pedicle of the tumor was separated from this dense fibrous band, and the latter cut through.

The tumor was found to emerge from an opening, about one-half or two-thirds of an inch in diameter, in the first vertebra of the sacrum,

resulting from imperfect development of its laminæ. The pedicle was about one-half an inch in diameter, and closely filled this opening.

The hips were then raised and the tumor compressed, in order to return as much of the spinal fluid within the membranes of the spinal cord as possible, and a stout catgut ligature was now tied around the pedicle.

At the moment the ligature was tightened a sudden and rigid extension of the lower limbs took place, and also a marked change of the respiration. The audible breathing became silent, and but for the respiratory movement of the chest and abdomen might have been thought to have ceased. A trocar was thrust into the tumor, and three fluidounces of cerebro-spinal fluid were withdrawn; the sac was now cut open, and the cauda equina was found included in the ligature, and the extremity adherent to the dural lining of the sac.

With the hips elevated the ligature around the pedicle was quickly cut. This done the respiration soon became normal, and the other nervous symptoms rapidly abated. The caudal extremities were spread out fan-shaped at their attachment to the lining of the sac; these, with that portion of the dura to which they were attached, were hurriedly dissected from the sac, and an unsuccessful attempt made to return this mass within the spinal canal. The lumen of the pedicle would not admit this, and about three-fourths of an inch of the extremity of cauda, with the adherent dura, was excised. This fan-shaped extremity removed, the remaining portion was readily returned through the opening. Again the pedicle was ligatured and the patient's body replaced in a horizontal position. No nervous symptoms now occurring, after waiting long enough to feel certain that no spinal fluid was escaping, the sac was excised close to the ligature and the stump returned within the spinal canal. The wound was then closed by deep and superficial catgut sutures, and a braided catgut drainage left in the lower portion of the wound.

With aseptic gauze and absorbent cotton the wound was carefully dressed, and this dressing protected as much as possible by oiled silk and adhesive plaster to save it from being soiled by the fæces and urine. The patient was now wrapped in warm blankets, and directions given to keep him warm, and to give only a little whiskey and warm water till evening. The little one rallied well from the anæsthetic, and during the night and next day was allowed to nurse but little. All went well until about 1 o'clock, P. M., the second day, when a convulsion came on. This did not last long. In half an hour the patient was conscious, observant, and bright again. Prescribed ℞.—Elix. pot. brom., f℥j. Sig. five to ten drops every hour. Five drops of above were administered every hour, and no more convulsions occurred, though once or twice the parents thought the babe more nervous, and gave ten drops.

On the third day, November 16th, the temperature was normal and the dressing was removed, owing to its being soiled with fæces. About three-fourths of the extent of the wound was united, the remainder looked well, with a slight serous discharge from the point where drainage was left, and midway between the extremities of the wound.

November 17. The dressing was not removed; patient doing well.

18*th*. The wound all united except a small opening at each of the points before referred to.

19*th*. Apparently doing well; dressing not removed.

20*th*. Found a slight elevation of temperature and some redness at

the unhealed points; also found that the dressing had been more than usually soiled with urine and fæces.

21*st*. Temperature 101° F., and the unhealed portion of wound appearing about as on previous day.

22*d*. Found a slight discharge of pus from the wound. Using a weak solution of carbolic acid the wound was well washed out, the fluid passing into one opening and out at the other, and then dressed with iodoform gauze. This treatment was continued until the 26th.

26*th*. Temperature normal, no pus, wound filling up and healthy in appearance.

28*th*. Doing well; opening nearly filled to surface.

29*th*. Temperature again above normal, patient not so well, though no change yet in wound.

30*th*, A. M. Found elevated temperature, a deep erysipelatous blush of wound and surrounding parts, and right leg very much swollen with considerable pain on moving it. Prescribed

℞.—Quin. sulph.	gr. xvj.
Yerbazin	f ℥j.—M.

Sig.—Half a teaspoonful every four hours.

Ordered wound to be freely bathed with a warm, weak solution of carbolic acid, and the following as a warm lotion to be kept continually on the swollen limb:

Tr. opii.	f ℥j.
Liq. plumbi acetatis	f ℥iij.—M.

30*th*, 9 P. M. A slight reduction of temperature and less pain on movement of limb.

December 1. The swelling of limb reduced, temperature lower, slight discharge of pus from the wound; general appearance better.

2*d*. Still improved.

3*d*. Temperature was found normal, but little swelling of leg, and but a trace of pus.

4*th*. No pus, no swelling of leg, and no pain on movement.

8*th*. Found the wound all healed except a small opening at inferior portion of wound. The patient had a better color and appeared to be gaining again.

10*th*. Wound completely healed. Cicatrix smooth. Child playful and gaining flesh.

16*th*. Found the little patient dressed, sitting on his mother's lap playing, the wound smoothly and firmly healed, an apparent increase of flesh since last visit. Pronounced the case recovered.

February 11, 1890. To-day the little boy is five months old and weighs twenty-one pounds. The parents say he is as strong, large, bright, and active as any of their children were at his age. He has perfect use of his limbs and can easily support his weight on his feet. No apparent effect from loss of extremity of cauda equina.

April 11. Seven months old, weighs twenty-three and three-quarters pounds; healthy, strong, and vigorous. Dentition is under way, the two lower incisors being well through, and the gums swollen with the upper incisors. The child sits alone on the floor and plays, and can stand by a chair or any object by which it can hold on. It has perfect use of its limbs and shows no nervous symptoms whatever, and it is now nearly five months since the operation was performed.

REVIEWS.

LEHRBUCH DER GEBURTSHÜLFE EINSCHLIESSLICH DER PATHOLOGIE UND THERAPIE DES WOCHENBETTES. FÜR PRAKTISCHE AERZTE UND STUDIRENDE. Von DR. F. WINCKEL, Professor der Gynäkologie und Director der Königl. Frauenklinik, Mitglied des Obermedicinalausschusses und des Medicinalcomités an der Universität München. Mit 188 Holzschnitten im text. S. 940. Leipzig: Verlag Von Veit u. Comp., 1889.

A TEXT-BOOK OF OBSTETRICS, INCLUDING THE PATHOLOGY AND THERAPEUTICS OF THE PUERPERAL STATE. DESIGNED FOR PRACTITIONERS AND STUDENTS OF MEDICINE. Translated from the first German edition, with permission of the Author, under the supervision of J. CLIFTON EDGAR. 8vo., pp. 927. Philadelphia: P. Blakiston, Son & Co., 1890.

THE work under review is the product of six years' labor by an accepted master in a country which indisputably leads the world in scientific medicine. The acknowledged preëminence of Germany in all scientific studies is the result not so much of the genius of the people as of a paternal government which displays the most consummate wisdom in its direction of educational matters. The training of medical students, of those men who will have the health of the nation in their charge, receives the attention which its importance should always demand in a highly civilized state. Medical schools are distributed at judicious intervals through the country. All the clinical material of their districts is concentrated and employed to the full for the practical training of the students. The teachers are selected with an eye singly to their fitness for the posts they are to fill; they are given salaries that enable them to devote the greater part of their time to study and instruction, and anything they desire in the equipment of their department is granted them. Thus it is that in Germany men of the highest ability are given opportunities to study, to observe, to gain skill in the management of a number of cases that seem, in countries less happily governed in this respect, simply incredible. The author of this work, for instance, gives to the world the result not only of long and profound study, but of a personal experience in more than twenty thousand obstetrical cases. A contrast, this, to a system which permits medical schools to exist as business enterprises, often of the most disreputable character; which forces those institutions that strive for a higher ideal to contend with poverty, and to depend upon the contributions of private individuals; which allows clinical material to be frittered away in wide distribution, often in the hands of individuals incapable of understanding its value.

Winckel, it seems to us, appreciates more fully than any modern writer on obstetrics, the advantages of his position. He asserts his right to speak *ex cathedra*, and there are few who will dispute it. All through

the book individual views are plainly, perhaps dogmatically, advanced, but they are supported by an experience and knowledge of the wants of others which disarm criticism. Few writers on any large division of medical science would be able to illustrate their work entirely by original drawings. That Winckel has done this, shows the range of his experience, and the unusual care with which it has been studied and recorded.

There are certain questions of the day in obstetrics on which Winckel's opinion will naturally be sought with interest. The treatment of abortion and of extra-uterine pregnancy; the causes and management of eclampsia, and the etiology and prevention of puerperal infection are some of these. In the management of abortion Winckel advocates again his well-known views; a conservative course is advised, with frequent disinfection of the parturient tract, until the whole ovum, or a retained decidua or placenta, is expelled rather than operative interference, on the ground that the latter may be the cause of general infection if the retained portion of the ovum is putrefying, by the infection of slight wounds through which invading microbes might gain access to the blood-vessels or lymphatics.

In the treatment of extra-uterine pregnancy, electricity and injection of morphine into the sac are recommended, unless urgent symptoms demand laparotomy: measures which future experience, in our opinion, will condemn as useless. For advanced extra-uterine gestation, laparotomy is, of course, advised, but, curiously enough, complete enucleation of the sac is ignored.

As throwing light upon the causes of eclampsia, prominence is given to the investigations of Stumpf, who found acetone and sugar in the urine of eclamptic patients. A very clear and definite scheme for the treatment of eclampsia is given. Its essential features are diaphoresis, the use of chloroform, and the administration of chloral by the rectum.

The important subject of puerperal infection is fully and clearly dealt with in all its aspects. The still disputed auto-infection, the many kinds of infecting germs which may invade the puerpera, the numerous manifestations of local and general infection, with their preventive and curative treatment, are robbed of the confusion which has long surrounded them. The possibilities of antisepsis in obstetrics are defined; the death-rate from infection should not rise in private or hospital practice above 0.25 per cent.

It goes without saying that we estimate this book highly; indeed, all things considered, we do not know its equal. That it is written in a foreign tongue need no longer be a bar to its wide distribution among English-speaking readers. A translation has appeared very shortly after the publication of the work in German. In all essentials this must have been a fair reflection of the original. Only in clearness of language and literary style could it have been inferior. But in this respect the translator, in our opinion, has performed his task excellently. We believe that this book should find a place in the library of every obstetrical practitioner who desires, in justice to his patients and himself, to be well abreast of the times.

B. C. H.

MAY'S DISEASES OF WOMEN. Second Edition. Revised by LEONARD S. RAU, M.D., Attending Gynecologist to Harlem Hospital, Out-door Department, New York; Attending Physician to the Out-door Department of Bellevue Hospital, New York. 12mo., pp. 373, with 31 woodcuts. Philadelphia: Lea Bros. & Co., 1890.

THIS book is avowedly a compilation. Its object is peculiar. Unlike most larger treatises on the subject, it aims at nothing original and at giving little in minute detail, but tries to give in a most concise form the accepted views of the present day. Indeed, so rigid is the condensation, that much of it is mere category; but the classification is so clear that the purpose of enabling the student to *review* the subject, or the practitioner rapidly to refresh his memory, is admirably fulfilled. Taking as authority some of the best systematic writers, and giving in the main an opinion which is a consensus, there is an absence of personal bias which is not the least valuable point in the work. The difficulty of carrying out the extreme of classification which pervades the book is illustrated in the chapter on Affections of the Vulva. Under the main heading "*Neuroses*," it is said: "These include: 1, Pruritus Vulvæ; 2, Dyspareunia; 3, Vaginismus; 4, Coccygodynia." Now, while allusion is afterward correctly made to the wide origin of dyspareunia, for instance, the awkwardness is apparent in classifying this mere symptom of manifold disorders as a neurosis. But for the purpose of clear presentation of any subject, nothing can exceed the value of systematic arrangement.

In the chapter on the Perineal Body the various forms of prolapsus are considered. The author evidently believes in the importance of the perineal body in the mechanics of support, for the only operations he describes for the restoration of the pelvic floor are two: the old triangular operation, which in practice has often been found wanting in good results; and, second, the flap operation of Tait.

A most instructive and suggestive chapter is that on the Affections of the Vagina, and with few exceptions much praise may be given to the three on the uterus. Eight pages are given to the consideration of inversion of the uterus, which is relatively more than its share.

The short but excellent chapter on the Fallopian Tubes (pp. 10) has been brought well up to date in the present edition.

The electrical treatment of fibroids is dismissed with the following scarcely accurate description: "A galvanic current is passed through the tumor by *puncturing the abdomen on each side with steel electrodes* (italics ours); with this instrument a diet consisting largely of nitrogenous matter is selected." (Page 167.)

The chapter on the Pelvic Connective Tissue is the only one which should be rewritten. Since post-mortem examinations and laparotomy have shown in recent years how "pelvic cellulitis," so-called, has been in most cases merely unrecognized tubal disease and pelvic peritonitis, opinions on the subject have been greatly modified. Few published books really represent their authors' present views on this subject.

Decided preference is expressed for electricity in tubal pregnancy, laparotomy being reserved for the abdominal form, and delayed to term, or still longer if the child dies. The extreme rarity and difficulty

of *bona fide* diagnosis prior to rupture, and the enormous mortality to mother and child in the few late operations, are not sufficiently considered.

We are obliged to take issue with the author upon the following points:

That in peritoneal irrigation after laparotomy it is ever justifiable to use 1 : 2000 mercuric chloride solution (page 296).

That after laparotomy a full dose of opium should be given as a routine measure, or a drainage-tube be closed by a cork.

That in peritonitis after operations opium should be given "up to tolerance," if, indeed, any be given at all. No mention is made of treatment by salines.

That in obscure diagnosis between ovarian cyst and normal pregnancy it is ever justifiable to dilate and explore the uterus (page 276). Even removal of the cyst need not terminate the pregnancy.

That it is advisable to wait for "pointing" in pelvic abscess (page 317), and then drain, preferably by the vagina, rather than to evacuate early and drain through the abdominal wall, which is Tait's successful method.

That the hypodermic needle may be freely used for diagnosis in pelvic disorders—*e. g.*, in pyosalpinx (page 276), or extra-uterine pregnancy (page 362), etc.

In many of these points the author has doubtless departed from his original plan, the good plan of the book, namely, in the giving an individual rather than the best collective opinion.

Upon the whole, the book meets its purpose. Whole chapters have been written in other works without expressing more ideas than do pages in this. G. E. S.

SURGICAL BACTERIOLOGY. By NICHOLAS SENN, M.D., Ph.D., Professor of Principles of Surgery and Surgical Pathology, Rush Medical College, Chicago, Illinois. Octavo, pp. 270. Philadelphia: Lea Bros. & Co., 1889.

THE recent advances in the knowledge of the etiology of the infectious diseases has, as the author says, revolutionized surgical pathology, and for a clear understanding of the processes connected with surgical diseases a knowledge of the claims made by reason of new discoveries is necessary. Whether a work like the one under consideration furnishes the best means for obtaining this information is an open question, and it seems to us that a different plan might have been adopted which would have placed the results more quickly and completely before the reader. The book is a compilation of the experimental work of others with an interwoven and connecting thread of comment. The descriptions of the various organisms are not sufficiently complete to furnish standards for comparison to the experimenter, and this notably in the case of suppurative bacteria, which is greatly to be regretted, for there really seems to be a distinct need of a concise statement of the present condition of our knowledge and an intelligent forecast of the changes in opinion that are likely to come soon. Dr. Senn lays much stress upon the details without sufficiently emphasizing the broader principles underlying them.

There is no question, of course, that the influence of bacteria in the

production of numerous pathological changes is a necessary factor. At the same time the subject is so entirely in its infancy that very much dogma is not advisable. In the book under consideration attention is not sufficiently called to the possibilities of "mixed infection" and of the activity of the ptomaïnes and leucomaïnes—the results of bacterial and tissue-cell life—in producing those changes for which the bacteria alone are held responsible by those not especially familiar with the practical work upon the etiology of infectious diseases as now conducted.

H. C. E.

HAND-BOOK OF DERMATOLOGY. By A. H. OHMANN-DUMESNIL, A.M., M.D., Professor of Dermatology, St. Louis College of Physicians and Surgeons. Illustrated. 12mo., pp. 167. St. Louis.

THIS small hand-book, or epitome, as it might better be called, the author states was written as a guide to students in their reading. It is one of the smallest of the current books of the kind. While a good deal has been crowded into its pages, we think much useful information has been omitted, especially in therapeutics. The general statements and the descriptions of the diseases are in accord with the teachings of the majority of American dermatologists. The directions given for the treatment of eczema are general and somewhat vague. The formula for a caustic alkaline tarry solution, for example, is given without informing the reader in what proportions it should be diluted. The list of local remedies mentioned is a small one, and we look in vain for such valuable agents as salicylic acid, resorcin, and ichthyol. Another page might well have been devoted to the treatment of eczema.

We note throughout the volume that the subject of therapeutics does not receive sufficient attention. In saying this we are not unmindful of the statement of the author that he has been careful to include only those remedies and methods of treatment generally recognized as useful. We think too conservative a course has been followed in this matter. The illustrations are poorly executed. The classification presented is that of the American Dermatological Association, which must prove acceptable to all readers.

REPORTS FROM THE LABORATORY OF THE ROYAL COLLEGE OF PHYSICIANS, EDINBURGH. Edited by J. BATTY TUKE, M.D., and G. SIMS WOODHEAD, M.D. Vol. II. 8vo., pp. 279. Edinburgh and London: Young J. Pentland, 1890.

WE learn from the preface to this handsomely published volume, that it is the second of its kind. It embraces the results of a year's laboratory work, comprising the examination of 201 clinical and pathological specimens, with reports upon the same, and 139 photographs of clinical cases, and of microscopic and other specimens which have been taken for members of the profession in Edinburgh and elsewhere. The result

certainly justifies the statement of the preface that the probationary period of the laboratory is passed. The Edinburgh College is to be congratulated upon the work done, and the excellent manner in which its results are given to the profession.

A large portion of the volume is given up to obstetric studies. The first of these is an important communication by Barbour and Webster upon the "Anatomy of Advanced Pregnancy and of Labor as studied by means of Frozen Sections and Casts." Four subjects were used in its researches: the first, a case of pregnancy at the beginning of the eighth month; the second, a woman dying in labor just commencing; the third, and most important of all, the body of a patient dying toward the end of the second stage of labor, and last, a case of death immediately after the completion of the third stage. The points to which attention was especially directed were the relations of the connective tissues in the pelvis as they are affected by labor, and the relations of the connective tissues to the ureters and bloodvessels of the pelvis; also the changes in the relations of the peritoneum in the course of labor; the changes in the position of the bladder; the thickening and distention of the uterine wall during its contraction and retraction in labor, and the relations of the cervix and vagina. In addition to these, the condition of the placenta and membranes, and the changes in the form of the fœtus during labor were investigated.

The technique of these researches consisted in obtaining the cadaver as soon as possible after death, great care being taken not to disturb the parts; the chief bony landmarks were fixed by means of pins to serve as guides in making sections, and the body was frozen for four days. Sections were cut with a broad-bladed saw, which gave perfectly flat surfaces, the sections were placed upon ice and carefully sketched, tracings being taken upon transparent gelatine plates, transferred to paper, and completed in colors. In two cases, the parts of the fœtus were removed, put together, and a completed cast in plaster was made; the entire genital tract was photographed and sketched, and a plaster mould obtained from which gelatine casts were made.

Contrary to the assertions of Stratz, Barbour does not believe that post-mortem displacements of organs occur sufficiently great to invalidate results obtained by this method. The results obtained by Braun, Waldeyer, Chiari, Hart, and others, are compared with those which these investigations yielded.

The third of these specimens already alluded to was the body of a woman regarding whom nothing was known, and in whose body no cause of death was found except fatty degeneration of the heart. She died when labor was well advanced, and furnished a remarkably interesting study; the head of the fœtus was in the pelvis, and the caput had already formed; the occipital bone was beneath both parietals, the body of the child lying transversely, its back to the left side of the mother; the retraction ring formed a well-marked ridge about the genital tract, posteriorly it was opposite the junction of the last two lumbar vertebra, anteriorly three-quarters of an inch above the brim; two inches below the other a prominent ridge was observed between the os internum and os externum corresponding to the cervical wall between the arms and neck of the child; the distinction between os internum and cervix could not be made without microscopical examination; the entire length of

the genital tract was fourteen and one-fifth inches; the placental area was on the anterior surface of the uterus as usual.

Although the membranes had ruptured, the umbilical cord and amniotic fluid remaining in the uterus occupied nineteen cubic inches of space, the pelvic floor projection was two inches, showing that during the second stage the projection is first increased, and as the head drives the coccyx backward it is diminished.

The vagina and cervix were greatly thinned, but the connective tissues were packed so tightly between them and the bones as to lessen greatly the danger of rupture; at this stage of labor the portion of the genital tract within the pelvis has peritoneum in relation to it only posteriorly, a point of importance regarding rupture; the bladder becomes an abdominal organ, and may be distended in its compressed portion; these specimens, and others which the authors have examined, made them believe that the placenta does not become separated during the second stage of labor as the result of diminution of its site; its elasticity is such that it shrinks considerably, following the wall of the uterus as it contracts without separating; regarding the fœtus, the obturator muscles were found to influence the moulding of the head. There seemed a diminution rather than an increase in the flexion of the fœtus during pregnancy; the oval tumor which the fœtus forms at the beginning of labor had been converted into a cylinder, and critical examination of the pelvic floor with a comparison of the results obtained by Schröder, investigations already mentioned, and the authors' lead them to accept Hart's teachings on this subject as correct.

An interesting study of a patient who died just after delivery concludes these most instructive investigations.

We miss from the bibliography the comparatively recent work of Hofmeier and Benckiser; the illustrations are excellent, and the series of studies form a most valuable work in obstetric literature.

The remainder of the volume comprises Symington's study of the pelvic floor, followed by several studies by Hart, which have already been made known to obstetricians in the *Edinburgh Medical Journal;* they are illustrated to advantage in this number, and have already met with the appreciation which they deserve.

Two papers of an especial value to surgeons are included in the volume: one is a paper on "Tuberculosis of Bones and Joints," by Thomson, and the other, a study on "Necrosis of the Bladder," by Haultain; both are well illustrated, and are additions of value to the literature on these subjects.

The volume is concluded by studies in physiology, in the chemistry of the urine, and in the microscopic anatomy of species other than human, which indicate the excellent scope of the work done in the laboratory. We trust that the time is not far distant when the cities of this country possessing established and flourishing medical societies shall be the sites of such scientific workshops as the one from which this volume emanates; such laboratories should not be restricted to the professors and instructors in any one medical school, but should be open for research to members of any reputable society; such a laboratory should not form a factor in the commercial rivalry existing between American medical colleges, but should afford each studious practitioner of medicine an opportunity to investigate clinical cases and verify clinical observations; the support of such institutions is a matter difficult of solution where

royal aid is not forthcoming, but the recent establishment in New York of excellent laboratories makes the solution of the problem far from hopeless.

ILLUSTRATIONS OF DISEASES OF THE SKIN AND SYPHILIS, WITH REMARKS. By TOM ROBINSON, M.D. 4to. Fasciculus 1. London: J. & A. Churchill, 1890.

THIS number—the first—of this new atlas of skin and syphilis contains three colored plates, one of which presents two figures. The subject illustrated by the first plate is "the aspect of inherited syphilis," showing the various cutaneous symptoms of a well-marked example of this condition. The coloring is good, and the details satisfactory. It is, in fact, the best of the several plates furnished. The others, showing palmar eczema, palmar syphilis, and kerion, are all fairly good representations. The artist—Burgen—tends, however, to give the various subjects an unnatural purplish tinge, which somewhat detracts from the otherwise excellent worth of this publication. The accompanying text adds to the value of the work. H. W. S.

PROGRESS

OF

MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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Excretion of Morphine in the Milk.

Numerous cases of poisoning are on record in which the administration of opium or morphine to a nursing mother has produced toxic symptoms in the infant. Dr. Pinzanni (*Journal de Médecine de Paris*, March 9, 1890) has found that when morphine is given in therapeutic doses it is not eliminated by the mammary gland as morphine, but it is in the body changed to apomorphine, and in this form is eliminated in the milk.

Dr. Pinzanni made twelve experiments on nursing women, giving to each of them either thirty drops of laudanum or four grains of morphine, distributed in divided doses through several consecutive days, one-half a grain being given during the first day, and the dose being slightly increased after each succeeding day until the total amount was given. The milk was then collected morning and evening and analyzed, the albuminoids being precipitated by the method of Ritthausen.

It was found that the entire amount of morphine was not so eliminated, either as morphine or as apomorphine, and that in certain instances it apparently was not eliminated in any marked degree. It should be noted, however, that this latter conclusion has been contested by Fehling, Tarnier, and Chantreuil, who especially lay stress upon the danger of believing that any preparation of opium can ever be given to a nursing woman without seriously endangering the life or health of the infant; and Fehling regards a case of poisoning occurring in an infant in which laudanum had been given to the nurse as illustrating the truth of his belief. Of course, this fact does not prove that in certain instances morphine may not be eliminated by the mammary gland, but that does not relieve one of the responsibility and recognition of the necessity for caution in giving opiates to nursing women.

A Case of Poisoning by Antifebrin.

Professor Brieger, of Berlin, reports a case of poisoning by antifebrin. A dose of only seven and one-half grains had been taken for headache three times in one hour. The condition of the patient was very alarming, and ether, coffee, and friction had to be used. The symptoms were cyanosis, palpitation, diplopia, and alarm. The headache which had passed off for the nonce, soon returned.—*Lancet*, March 8, 1890.

Santal Oil.

A paper in the *Wiener medicinische Blätter* of February 13, 1890, calls attention to the fact that the efficacy of specimens of santal oil is largely dependent upon the origin of the oil—whether obtained from the sandal wood of Zanzibar, Java, or Australia. The Chinese appear to have been the first to recognize the properties of santal oil in arresting gonorrhœa, and for a long time they have refused to make use of any specimens except those derived from Mysore; the Hindus, likewise, use the oil of the wood obtained from this locality, and a number of papers have recently been published which seem to indicate that the antiblenorrhœic properties of the oil from this source are especially marked. Dr. Handerson has used the oil from this source and has obtained success where copaiba balsam and cubebs were perfectly inefficacious. Other observers have found oil of santal an active remedy in acute inflammation of the bladder and in chronic urethritis.

In all instances the results obtained were in proportion to the purity of the preparation. It may be given in doses of about three drops, in capsules, in acute gonorrhœa, eight to twelve capsules being given daily; in other affections three to six capsules would be sufficient. The treatment should, of course, be continued for some time after the cessation of the discharge.

Use of Borax in Epilepsy.

Dr. Stewart, assistant medical officer at the Glamorgan County Asylum, has reported seven cases illustrating the value of borax in epilepsy. Case 1, admitted at the age of thirteen, had had epileptic seizures dating from birth, occurring in numbers varying from two to twelve per day, and chiefly at night. She had been under treatment repeatedly, but had derived no benefit. Without treatment the fits during the first week were twenty-six in number, under borax they were reduced to twenty-four in the second and five in the third week. After an interval, free from fits, of sixteen days, four occurred on two successive nights; then, after another interval of nine days, a single fit took place, and since that there had been no recurrence of fits—*i. e.*, a clear interval of over a month.

Case 2 began to suffer from nocturnal epilepsy at eighteen, and came under treatment five years afterward. This case was complicated by serious cardiac disease, stenosis of the mitral orifice. Without treatment, the average monthly number of fits was one hundred and one, and under borax this was reduced to twenty in the first month, seven in the second, one in the third, five in the fourth, none in the fifth, and one in the sixth.

In three others of the seven cases in which the fits occurred, both by day and by night, bromide was shown to exercise a decided influence upon the diurnal seizures, leaving the nocturnal practically unaltered, and in these benefit was experienced from the combined use of bromide and borax, three doses of the former during the day and one single dose of the latter at bedtime.

Dr. Stewart concluded that borax exercises a peculiar influence over nocturnal seizures, and that it is in cases where fits are entirely of that kind that the greatest good may be expected; that bromide, on the other hand, exerts a more powerful influence over diurnal seizures, and that in cases characterized both by day and night fits, a combination of these two remedies will be productive of most benefit.—*Lancet*, April 26, 1890.

A New Remedy for Sea-sickness.

In the few cases of sea-sickness which Surgeon Charles W. Hamilton, R. N, has had to deal with of late, he has found the internal administration of the seed of the kola (sterculia acuminata) a most successful remedy. Half to one drachm of the seed chewed slowly was followed, in about forty minutes, by complete cessation of the various symptoms of *mal de mer*, the depression, vomiting, and giddiness disappeared; the heart's action was regulated and strengthened, and a confidence during heavy weather was obtained that his cases had never before experienced in the many years they had served in the royal navy, and had tried the usual remedies prescribed by their advisers. This remedy seems to be reliable only when freshly procured.—*British Medical Journal*, May 10, 1890.

Ouabaïn in Whooping cough.

This alkaloid is obtained from the roots of Ouabaïo, a plant nearly related to the Carissa schimperi. It is a crystalline substance, soluble with difficulty in cold, more soluble in hot water. It is best dissolved in strong alcohol.

This substance has been used since October last by Dr. William Gemmell, who has treated forty-nine cases of whooping-cough with it. Of these, twenty-five recovered, four died, and the others are still under observation. Of the four fatal cases, one died from diphtheria, one from tubercular meningitis, one from acute capillary bronchitis, and the fourth from gradual and progressive emaciation. None of the fatal cases were under treatment with ouabaïn for a longer period than ten days, one of them only for four, and in all of them ouabaïn had been stopped at least a week before death took place. In none of the fatal cases were there any symptoms which might have been interpreted as indicative of ouabaïn-poisoning.

A careful record was kept of the temperature, pulse, respiration, urine, skin, etc., and the effect of the drug on the number and character of the coughs and whoops of each patient in twenty-four hours was closely watched. Except in one remarkably severe case, treatment was not begun until the patient had been eight days in the hospital; this was to enable comparison to be made of the periods before, during, and after treatment. No patient was dismissed until at least a fortnight after the last cough. The following is a summary of the results of the investigation: Ouabaïn is of marked benefit

during all stages of whooping-cough, and, if carefully used, produces gratifying results. In the first stage it cuts short the attack; in the second it reduces the violence and frequency of the cough, and diminishes the number of whoops, and, in the third, it hastens convalescence in a remarkable manner.

Ouabaïn is a drug which does not appear to be cumulative: its administration can be stopped suddenly without any ill effect beyond an exacerbation of the whooping-cough; it can be as suddenly resumed. It should be given, at first at any rate, in doses not larger than one-thousandth of a grain every three hours, $\frac{1}{125}$ of a grain daily. For children under one year of age, the dose should not exceed one two-thousandth of a grain every three hours. In children of from six to twelve years of age, if the cough be very violent, and the whoops are numerous, one five-hundreth of a grain may be given at a dose, but the action of the drug must be carefully watched.

The simplest way in which to administer it is to dissolve one grain of ouabaïn in distilled water so that each minim of the solution shall be equal to one-thousandth of a grain.

℞.—Solution ouabaïn . . . . . ♏xlviij.
Syrupi aurantii . . . . . ℥iv.
Aquæ, *ad* . . . . . ℥vj.—M.
Sig.—A teaspoonful every three hours.

Under the administration of ouabaïn it is found that the temperature, pulse, and respiration are, in uncomplicated cases, slightly below normal. When the drug is pushed the respiration becomes very slow indeed. In a patient four years old it was often as slow as sixteen per minute. It is from its effect upon the respiration that danger is to be expected. An occasional irregularity of the pulse has been noted, and this always occurred in the evening.

Within a few days, always less than seven, and usually three, of beginning treatment, patients are noticed to be perspiring freely, and this is observed to continue so long as the drug is being given. The patient ceases to perspire so freely shortly after the drug is stopped.

The movement of the bowels is regular, the average number of motions daily was one and a third. In no instance was there any of the diarrhœa which is usually so troublesome a feature in whooping-cough. The appetite improves, as also the general condition of the patient.—*British Medical Journal*, April 26, 1890.

The Administration of Nitrous Oxide Gas.

Dr. Silk has reported to the Odontological Society notes on a series of 1000 cases in which nitrous oxide was administered, and which had been systematically recorded by the author.

In twelve per cent. there was more or less itching, in two per cent. asphyxial symptoms necessitating pulling forward the tongue; a good many became hysterical, and several suffered after-effects; but seventy per cent., as far as was known, had no trouble. The average quantity of gas used was between four and five gallons, and the average time during which the face-piece was in position was sixty-seven and a half seconds. The duration of the anæs-

thesia was very variable, as it was exceedingly difficult to know when sensibility was recovered; the absence of the conjunctival reflex, or the presence of jactitations, was no guide. In 467 cases pure gas was employed, either from the bottle of compressed gas or through a gasometer, and in 502 a supplemental bag, where the same gas was inhaled over and over again. The record showed that unpleasant effects had immediately followed more often with pure gas than with the use of the supplemental bag, whereas the remoter symptoms occurred in greater number after the use of the supplemental bag; but this was more apparent than real, owing to the less number of cases where pure gas was used, and the great difficulty of getting an authentic account of the after-history of the patient. Micturition occurred in ten cases, or one per cent.; all were females. In three of these there was opisthotonos, and in one much struggling. Erotic movements and sexual illusions were present in six cases—all females; five of whom were unmarried, and one married and in an early stage of pregnancy. There was great difficulty in getting records as to the after-effects of nitrous oxide, but probably more or less headache was the rule rather than the exception.

There was no danger in giving the gas to epileptics. In the only case during lactation the patient had a bilious attack next day, and the infant seemed upset. In one case of valvular disease of the heart, the patient had gas four times, the lividity following being more lasting than normal, and on one occasion a tendency to syncope ensued. In nine cases of pregnant women nothing had gone wrong, but in most there was a tendency to vomit.—*Lancet*, June 14, 1890.

Accidents with Cocaine.

Dr. Delbosc, a pupil of Dr. Reclus, hospital surgeon, who vaunts the employment of cocaine in surgical operations, has just published a statistical and clinical report on the accidents produced by this substance. He collected the histories published of accidents, from which he has been able to establish that up to the present time only five deaths have occurred after the use of cocaine. This proportion would evidently go against the method if only the bare facts be accepted without interpreting them. From the various observations published, it would appear that death resulted from the enormous doses that were administered, varying from about eleven grains to double that quantity. According to Dr. Delbosc, cocaine may be employed at the maximum dose of three grains, although he would not advise such a dose ordinarily, as beyond that quantity serious accidents occur.

To avoid rapidity of absorption, solutions too concentrated should never be employed. Dr. Reclus has adopted a two per cent. solution, and he has never since had any accident, although he has performed, since June last, twenty-five important operations. It is not necessary in order to obtain anæsthesia to push the needle into the muscles or the subcutaneous cellular tissue, but into the thickness of the dermis. In spite of all precautions accidents may occur, and for them nitrite of amyl, injections of ether and caffein are indicated.—*Medical Record*, June 7, 1890.

Dr. Mitchell has employed coffee in a great many cases when the toxic symptoms of cocaine began to show themselves, and always with perfectly

satisfactory results, and to relieve the extreme nausea, with heart-failure, that sometimes follows the administration of ether.

It is used as ordinarily prepared for the table, and is just as effective when used cold as hot. He does not think caffein would answer as well.—*Medical Record*, May 31, 1890.

The Prevention of the Toxic Effects of Cocaine.

Dr. Isidor Gluck has had occasion to use cocaine frequently in diseases of the eye, ear, nose, and throat, and seeing at times most alarming effects from its use, came to have a certain dread of it.

It is, when used in the treatment of the nose and throat, and when used hypodermically, that cocaine produces most alarming symptoms. Though employed in strengths varying from four per cent. to twenty per cent., sometimes the weakest solutions will produce the toxic effect in one susceptible.

He now uses the following solution:

℞.—Phenol	gtt. ij.
Aquæ destillat.	ʒj.
Shake until solution is perfect, then add	
Cocaine hydrochlorate	grs. x.

This formula has been in use for more than a year, and since using no toxic effects of the drug have had to be treated. It has been used in any quantity in any part of the nose or throat, without the least fear of harmful consequences. Phenol is itself a local anæsthetic, and is supposed to prevent absorption of the cocaine by forming a very superficial eschar, and thus its toxic action is avoided. Further, the phenol prevents congestive reaction, prevents the decomposition of the solution, and renders it aseptic.—*Medical Record*, June 21, 1890.

Cocaine and Morphine.

Dr. Dabbs has found that the morning sickness which complicates the continuous use of morphine hypodermically, can be annihilated by combining one-third of a grain of cocaine with the morphine solution; even though the morphine has to be steadily increased.

[One-third of a grain of cocaine subcutaneously would be a large dose for some patients.—Ed.]—*British Medical Journal*, June 14, 1890.

Coffee in Cocaine-poisoning.

The many and varied symptoms arising from cocaine-poisoning are so distressing to the patient and trying to the physician that the ingenuity of the latter is often taxed to the utmost in striving to relieve the same. All who have been called upon to relieve these cases have turned, almost instinctively, to such remedies as ammonia, brandy, and digitalis, and have been sorely disappointed where the symptoms were pronounced.

Dr. S. Mitchell used coffee with marked success in a patient who had had cocaine hypodermically. She appeared to have the whole body paralyzed, except her tongue, this unruly member continually uttering words of reproach

for the helpless and hopeless condition in which all the other members had been placed. After using ammonia, brandy, and digitalis, both subcutaneously and by the mouth, also heat and general faradization, without any apparent effect, unless it was to stimulate the patient's tongue, coffee was tried, a clear, large cupful being administered inside of two minutes. The effect was all that could be desired. The pulse soon improved, the pain and sense of oppression about the heart were relieved; in fact, all the disagreeable symptoms, except the stiffness of the muscles, passed away very rapidly, greatly to the relief of patient and physician.

Poisoning by Antifebrin.

The following case illustrates the dangers of self-medication. A healthy young married woman, who had been in the habit of taking antifebrin for headache, feeling pain come on one morning took, fasting, about a teaspoonful of the drug in some water. In about ten minutes, the headache not being relieved, she repeated the dose, which her husband remarked might prove dangerous. She consequently took a glass of milk and some alum water, in order to produce vomiting, which she succeeded in doing, but immediately afterward giddiness, singing in the ears, throbbing in the temples, and a dull pain in the head, together with a feeling of weakess, came on, and the face assumed a livid hue. About four hours after collapse occurred, and for three and a half hours her condition appeared hopeless. Among other things, the intravenous injection of a solution of common salt was used, and appeared to act most beneficially.

The patient was out of danger about fourteen hours after the drug had been taken.—*Lancet*, May 24, 1890.

MEDICINE.

UNDER THE CHARGE OF

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The Morphology and Development of the Blood.

Alex. Edington (*British Medical Journal*, 1890, i. 1233) gives an interesting account of the state of our knowledge regarding the blood, and details his own observations upon the subject. He refers to the very varying size of the red blood-cells, and the readiness with which this variation takes place. There is, namely, a distinct variation in the aggregate size between meals, the minimum occurring soon after a meal, while the maximum is seen at the end of a period of fasting. He had also observed that the cells are diminished in size at the termination of acute fever after an exanthem, while they are

largest during the fever. They are small in septic conditions which have lasted some time. He takes the ground that the corpuscle is surrounded by an investing membrane, formed by a condensation of the stroma.

In discussing the white blood-cells he refers to the various forms, as determined by the difference in size, character of the protoplasm, number of the nuclei, etc. He describes at length the methods to be employed in examining the blood, recommending that various plans be followed in every case, in order to eliminate error as far as possible. Staining is often an essential, and for this purpose he prefers the aniline dyes, especially dahlia, methyl-violet, and methyl-blue.

His study of the morphology of the white cell has convinced him that there is an advancing process by nuclear division, until the uninucleated cell becomes one of four nuclei. The protoplasm meanwhile increases in amount, until the final four-nucleated stage is reached, when it begins to stain less readily, as if it were becoming dissipated. The division of the nuclei in the white cells is not an evidence of necrobiosis, as has been claimed, for the characteristic regularity of the process is sufficient evidence against this. Moreover, this phenomenon in other cells is followed by division of the cell itself, and in the case of the white blood-cell such division does not occur. Were the white corpuscles derived from the lymph glands, we could hardly find so many multinucleated forms as we do, since the lymph corpuscle is a cell which possesses one large nucleus. Observation has shown him that the correct view is that when the white blood-cell has reached the four-nuclear stage, the nuclei are set free by the protoplasm being used up or otherwise dispersed, and are then in a condition to act their parts as uninuclear cells. From this view it is evident that white corpuscles may be produced from pre-existing cells within the general circulation.

The author then takes up the various descriptions which have been given of the hæmatoblasts or blood-plates, in order that this body may not be confounded with what he denominates "a new blood corpuscle." These bodies, which he names "albocytes," he believes to be undoubtedly the young form of the red blood-cell. They are small, very delicate, spherical bodies, difficult to detect until the observer has accustomed himself to seeing them. They have nothing whatever to do with fibrin formation, and do not tend to dissolve as Hayem's hæmatoblasts are said to do. In a slide of fresh blood prepared with a sealed cover, they may even be seen after the lapse of a week. In the presence of fluids of specific gravity less than that of blood serum, they suffer from osmotic change just as do the red blood-cells. It is possible to see that the larger of them are distinctly discoid, and one can easily follow their transition up to the condition of the true red blood-cells. The author, therefore, claims that the red blood-cells are derived from these bodies by their gradual growth and change in shape, and by the requirement of hæmoglobin. He has been able to discover the origin of these small corpuscles after long search, and gives a reproduction of a photo-micrograph illustrating their morphology. This is, namely, as follows: The uninuclear white blood-cells possess a large nucleus which stains intensely, and which is surrounded by a narrow ring of protoplasm, which, after a short time, assumes a very ragged appearance. The same method of staining will, however, reveal certain other white blood-cells, whose unusually large nucleus

stains but faintly. Within this nucleus is a nucleolus, also staining faintly; and within this again a very small endo-nucleolus, which is very darkly stained. Within the nucleus, and surrounding the nucleolus, may be seen a number of ill-defined small spherical bodies, the young albocytes, which become liberated in the blood under conditions not yet known to us. The white blood-cells containing these may be looked upon as mother cells, and he therefore denominates them "matricytes." The ring of protoplasm surrounding the nucleus in these cells differs from that in the ordinary white blood-cell in the length of time during which it remains intact. The albocytes may be distinguished from the granular matter of the blood by the fact that the granules possess a peculiar greenish, refractive appearance.

Finally, in discussing the granular matter of the blood, the author divides it into two sorts, one of which, probably the hæmatoblasts of Hayem, is quite evidently associated with fibrin formation, and which tends to break down in the way Hayem describes. The other sort of granules, which do not break down, might easily be mistaken for monads or bacteria. This kind he has observed to be extruded from the white blood-cells while they were undergoing amœboid movements. On being liberated they perform gyratory movements, and dance away across the field. They may also be noticed in an active Brownan movement. He believes that both of them are of the same origin, namely, from the white blood-cells; so that the white corpuscles are the chief agents in inducing fibrin formation, and of these corpuscles the granules of the first sort are the essential cause. The second variety of granules are of a similar nature, but older and undergoing degenerative changes, and have, therefore, lost their power of inducing fibrin formation.

Pernicious Anæmia.

Neusser (*La Sem. Méd.*, No. 79, 1890) divides pernicious anæmia into two forms—the primary and the secondary. Primary pernicious anæmia is a clinical entity opposed to chlorosis, leucæmia, and pseudo-leucæmia. Secondary pernicious anæmia may be provoked by many diseases, as by frequent hemorrhages; neoplasms; osteo-sarcomata; carcinomata, especially those of the stomach and the spleen; ulcers of the stomach and intestine; chronic nephritis; infectious diseases (tuberculosis, syphilis, diphtheria, septicæmia, malaria); diseases of the blood, as leucæmia and certain forms of myelogenic pseudo-leucæmia; intestinal parasites, as *bothriocephalus latus, tænia mediocanellata, ankylostomum duodenale*, and even *oxyuris vermicularis*. In the parasitic form, however, the diminution in the number of the red blood-cells rarely reaches that seen in the primary forms. The anæmia usually disappears with the expulsion of the parasite, unless the organism has been already too seriously affected. There may be the coincidence of primary pernicious anæmia with the presence of a tænia. As regards the pathogeny of primary pernicious anæmia, several factors favor its development, such as unhealthy external conditions, defective nutrition, psychic depression, and especially the puerperal state and lactation. In the anæmia of pregnancy the red blood-cells are considerably diminished in number, and the leucocytes equal 5000 to 6000 per cubic millimetre. If, however, the anæmia of the pregnant or parturient woman is due to a septic condition, leucocytosis

may be observed, which sharply distinguishes it from the primary, non-septic variety. Except when it follows a severe hemorrhage or occurs during pregnancy, pernicious anæmia begins during health. The symptoms are those characteristic of grave anæmia, and are described by the author. The gastric symptoms witnessed may be due to atrophy of the gastric tubules, or to simple impoverishment of the blood, or to a degeneration of the posterior columns of the cord, such as has been seen in some cases. They would then be of the nature of *crises gastrique*. The liver and spleen are usually increased in size. The fever seen in anæmia seems to be in direct connection with the diminution in the number of red blood-cells. The toxic substances derived from the hæmoglobin may exert a pyrogenic action, exciting the centre regulating heat; or perhaps the hæmoglobin or the products of its decomposition destroy the leucocytes and the hæmatoblasts and produce an intoxication of the organism by setting at liberty the fibrin ferment. This auto-intoxication may explain other symptoms, as the occurrence of embolism and thrombosis of the small vessels and some of the nervous troubles. The coincidence of febrile reaction and of embolisms in pernicious anæmia may give rise to errors in diagnosis. Thus there are cases of ulcerative endocarditis in which the clinical appearance is identical with that of pernicious anæmia. In the former, however, there are an irregularity of the heart and an alteration of the second sound at the apex.

The number of red blood-cells in pernicious anæmia may be diminished even to 500,000; the number of leucocytes diminishes in the same ratio, but the hæmoglobin, though also reduced in quantity, is not so in proportion to the loss in red cells. The presence of leucocytosis indicates a secondary anæmia. The appearance of nucleated red blood-cells may have considerable prognostic value. So long as they do not surpass in size that of the normal red blood-cell, and so long as the nucleus stains easily with the ordinary reagents, it may be concluded that the regeneration of the blood is going on in the normal manner.

Pernicious Anæmia and Sarcomata.

Israel and Leyden (*Berlin. klin. Wochenschr.*, 1890, 231) discussed before the Berlin Medical Society a case whose history was much as follows: The patient, a woman of about thirty years, exhibited an enlargement of the spleen, then disappearance of the patellar reflex, anæmia, irregular fever, diarrhœa, and severe pains in various parts of the body. Later, there were ascites and bilateral pleural exudate. Numerous small tumors then appeared in the skin. The blood exhibited a decided leucocytosis, and, beside this, the character of pernicious anæmia, being thin, and with abundant microcytes. Further, the large nucleated red blood-cells, which Ehrlich considers characteristic of pernicious anæmia, were present in this case in numbers which Leyden had never seen before. It seemed reasonable, then, to classify this case as one of pernicious anæmia; and yet the matter was not certain, on account of the enlargement of the spleen and the large number of leucocytes present, as well as of the fact that the appearance of the patient was not that of a typical case of pernicious anæmia.

The autopsy showed some fatty degeneration of the heart muscle, but by

no means to the extent seen in pernicious anæmia. The spleen was about ten inches in length, with abundant pulp and enlarged follicles. There were found tumors of various sizes, but none larger than a cherry, and though often widely disseminated through the muscles, they clearly took their rise from the external surface of the periosteum of the bones.

Nodular tumors were present in the marrow of the bones, chiefly in the long bones; the marrow was red and lymphoid in situations where there were none of the yellowish tumors. A few other nodules were found in other parts of the body; namely, on the pleura and peritoneum, and in the thyroid gland, the uterus, and pancreas. The macroscopical characters were those of the growths seen in leukæmia, but the microscopical appearance was quite different. The tumors were a large-celled growth, the cells being round, or often possessing processes, or spindle-shaped, or still oftener being very similar to those seen in the bone-marrow, though there were no giant-cells. Israel cannot answer the question as to the relation existing between the pathological conditions of the different systems of the body, and calls attention to the rarity of such numerous periosteal sarcomata. Leyden says that the autopsy revealed a combination of a sort of leukæmia, pernicious anæmia, and multiple sarcomata, but does not know in what way they stand related to each other.

On the Excretion of Hæmatin and of Iron in Chlorosis.

Hoesslin (*Munch. med. Wochenschr.*, 1890, 248) is of the opinion that there is no reason to separate chlorosis from other forms of anæmia as a peculiar constitutional disease. Virchow's opinion, that it is due to a congenital narrowness of the arterial system, is incorrect, as is shown by the fact, since learned, that the vessels which he considered abnormally narrow were not in reality so. The author is also opposed to the view that there is present in the disease any characteristic condition of the blood, such as a diminution of the amount of hæmoglobin without proportionate reduction in the number of red blood-cells; claiming that this relation may exist in other varieties of anæmia as well.

It is a very frequent occurrence that a girl, previously entirely well, becomes in the course of a few weeks extremely anæmic and chlorotic. Examination of the blood shows a great diminution in the amount of hæmoglobin; and the question arises as to how this loss has taken place. The author believes that it is not due to destruction of the blood within the vessels, and inclines to the view that it is simply the result of hemorrhage, and especially of concealed gastric hemorrhages. In the effort to substantiate this theory he examined the stomach in a large number of autopsies in different diseases, and found, he believes, the evidence that this, of all the organs, is peculiarly liable to suffer from hemorrhages of greater or less degree. He then made over 200 estimations of the amount of iron and of hæmatin present in the stools of normal persons and of chlorotic individuals, and found that in the latter both the iron and the hæmatin were decidedly increased.

That women, rather than men, are attacked by chlorosis is due, first, to the smaller amount of iron in their nourishment; second, to the smaller amount of HCl contained in their gastric secretion, on account of which a sufficient

amount of iron is not dissolved and absorbed; third, to the losses of blood sustained in menstruation.

Other points which the author advances in proof of his theory are: 1. The beneficial results following the administration of iron are due partly to the fact that the chloride of iron formed in the stomach from the iron administered is one of the best known hæmostatics; thereby checking the loss of hæmoglobin at the same time that it increases its formation. 2. The fact that cardialgia and digestive disturbances so usually attend chlorosis. 3. The greenish-yellow color of the skin, hitherto unexplained, is probably due to the resorption of hæmatin and hæmoglobin from the intestine, and their transformation into other coloring matters. 4. The fact that the disease usually does not appear before the time of puberty, and disappears after the climacteric.

Warnings of General Paralysis of the Insane.

Savage (*Brit. Med. Journ.*, 1890, i. 777) was for several years in the habit of getting friends of patients with this disease to fill in a printed sheet relative to the affection. In this way he obtained nearly a hundred such, and from these, combined with experience in consulting practice, he has drawn a considerable number of facts which he believes to be trustworthy.

General paralysis is, he believes, a degeneration rather than a specific disease, and is most commonly seen in middle-aged married men, inhabitants of cities, flesh-eaters, and drinkers of alcohol. It frequently follows constitutional syphilis; and is not uncommonly related to head injury or to causes of nerve-tissue disease, such as those produced by lead.

There are two special forms of onset: the gradual and the sudden. In the former there is a steady and progressive degradation of mind and body, so that the highest faculties show the first evidence of change. In the latter there is nothing to warn until suddenly a convulsive seizure, or an attack of emotional excitement or one of mania appears. Probably in both there were earlier changes going on which were hidden.

In many cases one meets with an account of early fatigue. This may precede the common symptoms by a year or more, and may for a time be replaced by a morbid buoyancy. This sense of fatigue is an important symptom, and is associated with indecision, doubt, gloominess, and even hypochondriacal weakness. It is only really valuable as a symptom when associated with predisposing conditions in which paralysis is common, and when one or more physical symptoms, as inequality of the pupils, or loss of power of expression by speech or writing, can be detected.

Ataxia may be the first symptom of general paralysis, or it may be a symptom of the disease occurring at any period during its progress. The author has known ataxic symptoms to be fully developed for several years before there was any suspicion of general paralysis. In these cases he has always found a history of syphilis. If the ataxy is part of general paralysis there will generally be muscular defect of the hands and tongue out of relation to the progress of the ataxy, and the symptoms will be either those of exaltation or of hypochondriacal melancholia; whereas, if the insanity be that of ordinary ataxy it will be of the suspicious or persecuted type.

One of the most striking and not uncommon of warning symptoms is temporary aphasia. This is not necessarily followed by general paralysis, but the author has seen cases in which this temporary aphasia has come on without apparent cause, and from this date there has been some defect of speech, the lips have been tremulous, or the expression faulty. It is common for these attacks of aphasia to recur at irregular intervals; and after several recurrences—it may be at intervals of a year or more—some other signs of disorder appear. In nearly all these cases disorders of speech and writing are early and clearly evident. The author has known such aphasic attacks occur nine years before symptoms of general paralysis developed.

Nearly related to aphasia, though usually coming after it, is a change in the handwriting. Some patients give up writing or alter their method of holding the pen for a year or more before signs of general paralysis are declared.

Facial expression is very early affected; the wiping out of the lines giving an appearance of fatness. Ptosis and external strabismus are rare as symptoms of general paralysis, but are very common as early symptoms of a diseased process which ends in general paralysis. Thus the author emphasizes his experience, that if after a history of syphilitic cranial nerve lesion there are any signs of nervous instability, there is reason to fear that general paralysis may be the result. In the same class of cases are the instances of serious head injury followed by local paralysis, which has passed off only to be followed by the steady mental and physical degradation which terminated as ordinary general paralysis. Recurring momentary slight or partial losses of power or sensation, sometimes comparable to attacks of *petit mal*, are warnings of general paralysis. An onset of fits of an epileptic type occurring in a middle-aged man, especially if he has had syphilis, prompt one to look for other signs of degeneration. If such fits occur at irregular intervals in an otherwise healthy middle-aged man, and if each fit is attended by marked mental changes, and if expression is in any way permanently affected, general paralysis is all but certain. These fits may precede the ordinary symptoms by several years.

Early sensory defects in general paralysis are not so easily recognized as are the motor alterations. Neuralgia, headache, sciatica, rheumatic pains, and the like antedated by a year or more the recognition of the disease in almost all the author's cases. Headache or facial neuralgia was the most common, in contradistinction to the rarity of headache in the insane. Double sciatica, especially if recurrent and associated with any change in character or habits, is a warning not to be overlooked. Temporary loss of sight, and alterations of hearing, taste, and smell, are sometimes early warning symptoms. Progressive loss of the highest refinement of some of the senses is manifest. Thus the general paralytic artist early loses the fine balance of tone and his colors become bold and crude.

In speaking of the intellectual changes which occur as warnings of general paralysis, the author calls attention to the loss of power of social accommodation as one of the earliest and most marked. The patient falls out of step with his fellows, though entirely unconscious of it. The actor forgets his part, the artisan makes misfits, judgment fails. Memory for recent events or engagements is defective, and this is especially marked if fainting or other

fits have occurred. Loss of power of attention, want of persistence, and restlessness are marked. Moral weaknesses are common; such as stupid stealing of useless articles, and indecent exposure due either to lust or to negligence.

The next group of early symptoms may be provisionally classed as instability. This is evidenced as tremors of the finer muscles, uncertainty of gait, tendency to falls. It is a very common thing to hear that a fall has been the cause of the paralysis, whereas it was but the evidence of early paresis. This instability is marked almost always by the extreme readiness with which the patient is affected by stimulants, or drugs, or poisons. This evidence of weakness of the damaged brain is practically of great value.

Change of temper and character are probably the most constant of all the changes of early general paralysis. Change of character, instability of purpose, occurring with some motor weakness, almost always point to general paralysis if met with in a middle-aged man. Hypochondriasis may be one of the warnings of the disease. In such cases the morbid ideas are, as a rule, centred in the gastro-intestinal tract, and in addition there are physical signs, such as inequality of the pupils or speech defect, to aid us. The occurrence of marked hysterical or hystero-epileptic fits is even more alarming than the epileptic fits in middle-aged men, to which reference has already been made. The sudden outbreak of mania, especially of acute delirious mania, unpreceded by melancholia, and without apparent cause, is a frequent precursor of general paralysis.

Pathological Anatomy of Friedreich's Ataxia.

Blocq and Marinescu (*La Sem. Méd.*, 1890, 76) report the result of the examination of the cord from a case of Friedreich's ataxia. The cord was irregularly and considerably atrophied both in its transverse and its antero-posterior diameter. The columns of Goll were diseased throughout; those of Burdach irregularly involved as far as the decussation of the pyramids. The crossed pyramidal tracts were altered throughout their entirety, but the lesion decreased from below upward as far as the decussation. The cerebellar columns were attacked from the lower dorsal region; the columns of Gowers were not affected, at least in the limits which have been assigned to them. The portion of the gray matter corresponding to the zone of Lissauer was involved in the inferior lumbar region, but completely free above; the external marginal zone was unaffected; the columns of Clarke were profoundly diseased in all their extent; both fine fibres and cells.

They come to the following conclusions:

1. The spinal cord presented in this case a diminution in volume greater than has been observed by other authors.

2. The distribution of the lesions was almost the same as has been established for the disease in other cases. It differed, however, in that the zone of Lissauer was invaded, at least in the middle and lower regions.

3. Friedreich's ataxia is distinguished from tabes by its topography (the involvement of certain parts of the lateral tracts) and by the nature of the lesions.

4. It differs from certain cases of combined tabes in that the sclerosis is

more systemic, and is subject to the laws of degeneration, not extending by continuity.

5. In regard to the nature of the disease, it is the result of an hereditary predisposition transmitted to the spinal cord, and which materializes itself primarily by a vascular alteration. Dependent on the circulatory alteration there follows an atrophy of the organ, and, at the same time, a sclerosis.

The disease, in short, is a disorder of evolution, characterized by a special sclerosis occupying systemically certain determinate regions of the spinal cord.

The Capillary Pulse and the Centripetal Venous Pulse.

Quincke (*Berlin. klin. Wochenschr.*, 1890, 265) formerly searched for the capillary pulse in the finger-nail, but found this method often unsatisfactory, on account of the lack of transparency. He therefore rubs the forehead with some hard, smooth body, as the lower end of the stethoscope, until a red spot is produced by the paralytic dilatation of the capillaries and smallest arteries. In this the systolic increase of the size of the redness can often be well observed. For the production of the pulse there should be the greatest possible difference between the arterial pressure during the cardiac systole and that during the cardiac diastole. The capillary pulse is best seen in aortic insufficiency, and depends on the amount of blood regurgitated as well as on the energy of the succeeding ventricular contraction. To permit of much aortic regurgitation, not only must there be extensive valvular insufficiency, but the ventricle must be able to contract; for if it be dilated and weakened, and unable to expel more than a portion of its contents, there is evidently not much room for regurgitation. Consequently, in disturbances of compensation in cases of aortic insufficiency, the characteristic peculiarity of the pulse often disappears; and it is only with return of ventricular strength that capillary pulse and the celerity of the arterial pulse can be discovered.

The capillary pulse is not observed in every case of aortic insufficiency, and conversely it may be witnessed in other conditions also, wherever the *pulsus celer* is found, as in anæmic and chlorotic conditions, and in many nervous and muscular alterations of the cardiac action. It may sometimes be seen in the everted under lip, or on pressing a plate of glass against the finger tip. In fact, a certain slight degree of external diastolic pressure favors the recognition of the phenomenon. It may even appear in the natural redness of the cheeks, and in any localized area of inflammation of the skin. The other conditions being present, it is especially well seen in erysipelas.

Pulsation of the retinal arteries is developed under conditions exactly similar to, though more complicated than those producing the capillary pulse.

Different from the conditions for the production of the capillary pulse are the circumstances under which the pulse-wave extends from the arteries into the veins, and the centripetal venous pulse is formed. The general opinion is that it is of rare occurrence, but the author disputes this, and says that he has seen it dozens of times. The chief conditions requisite for its occurrence are relaxation of the vessels, chiefly the arteries, but also of the capillaries and veins. This is especially common in certain stages of fever, as in sudden fall of temperature, accompanied by profuse sweat. Thus he has seen it in a

number of cases of typhoid fever, as also in recurrent and intermittent fevers, pyæmia, polyarthritis rheumatica, pneumonia, phthisis, and cholelithiasis. Nervous influences may join with the fever in producing it in such conditions as meningitis, spondylitis, encephalomalacia, and injuries of the cervical cord. He has also seen the venous pulse in afebrile conditions, as chlorosis and anæmia, and even in healthy persons whose peripheral vessels have been relaxed by the summer heat. It is witnessed in the veins of the forearm and back of the hand. Only once has he seen it on the dorsum of the foot. Besides the relaxation of the vessels, a number of other conditions seem necessary for the production of the phenomenon; such as thinness of the skin, a sufficiently powerful action of the heart, a certain degree of fulness of the veins dependent on the relaxation of the vessel-walls and the position of the arm at the time of examination. A slight change in the position of the member may be sufficient to cause the pulse to disappear. One must not expect to find the capillary pulse in every case of centripetal venous pulse; on the contrary, their combination is exceptional.

Though the later stages of fever are favorable to the production of the venous pulse, the condition which develops it to the best advantage is the combination of aortic insufficiency with relaxation of the vessels. Arteriosclerosis, also, may favor its occurrence, by transmitting a powerful pulse-wave into the smallest arteries. Venous congestion has not been, in his experience, liable to produce it.

SURGERY.

UNDER THE CHARGE OF

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Pulsatile Exophthalmos.

Lefort (*Revue de Chirurgie*, June 10, 1890), in an exhaustive article upon pulsatile exophthalmos, to which are appended a bibliography and a complete list of cases, summarizes the subject as follows:

Pulsatile exophthalmos is an affection characterized by prominence of the eye and pulsations perceptible on palpating either the eyeball or the orbit. These pulsations are isochronous with the arterial beat, are accompanied by a bruit de souffle perceptible over a rather extensive area, and by intra-cranial bruits which are perceived by the patient.

The affection may originate in an aneurism of the ophthalmic artery or of the internal carotid, or in a phlebitis of the cavernous sinus, but is most frequently caused by a rupture of the carotid artery into the cavernous sinus. The abnormal development of the ophthalmic vein, to which the pulsations of the carotid are transmitted, is the principal lesion, in the sense that it is this which causes the principal symptoms.

The affection is either spontaneous or traumatic. If spontaneous it is found much more frequently in women than in men, and corpulence exercises a decided predisposing influence. When traumatic it most frequently follows violence to the head, even though it is impossible in many cases to determine the existence of a fracture at the base of the skull which may have directly caused a rupture of the carotid.

In the spontaneous cases the onset is frequently sudden, and the disease is well established in a few days with all its symptoms. Traumatic cases are frequently gradual in onset, and the principal symptoms are not perceived for some time after the infliction of the injury.

In addition to the classical symptoms of the affection must be enumerated diplopia, loss of vision on the affected side, conjunctival injection, chemosis, paralysis of the muscles of the eye, ptosis, enlargement of the palpebral and peri-orbital veins, and the existence of a pulsatile tumor at the internal angle of the orbit.

Cricoid aneurism, angeiomata and vascular tumors of the orbit accompanied by prominence of the eyeball, by bruit de souffle, and by intra-cranial murmurs may readily be confounded with pulsatile exophthalmos. They are distinguished by three important characteristics:

1. The pulsatile peri-orbital vessels are arteries and not veins. 2. The maximum of pulsation is without and not within the globe of the eye. 3. If a pulsatile tumor exists it is found upon the outer and not upon the inner side of the orbit.

Pulsatile exophthalmos does not quickly result fatally. The patient has a prospect of at least some years of life. The symptoms, however, are very distressing, particularly the intra-cranial bruit, so that the sufferers are quickly driven to seek surgical aid.

In regard to treatment, direct compression upon the eye and subcutaneous injections of ergotine are useless. Intra-orbital coagulating injections are dangerous. Digital or instrumental compression of the carotid ameliorates for a time the principal symptoms, but it has practically resulted unsuccessfully when employed as a curative measure. Ligature of the primitive carotid is the only efficient treatment for a pulsatile exophthalmos. It is rarely followed by the cerebral complications so common when carotid ligature is employed under other circumstances. Nearly always ligation at once arrests pulsation and intra-cranial bruit. Frequently, however, these symptoms recur with lessened intensity some minutes, hours, or days after the operation. This apparent recidivity is not of serious moment, since cure frequently results; sometimes in a few hours, sometimes not for months. If the exophthalmos is double, or if there is recidivity in the case of unilateral exophthalmos treated by ligature of the carotid, the surgeon should not hesitate to ligate both carotids.

Three Cases of Fracture of the Sixth Cervical Vertebra.

The attention which has been recently paid to spinal surgery, and the conflicting opinions advanced in regard to the propriety of operation in cases of fracture of the vertebræ followed by paralysis, make the report of the three following cases by Dr. W. S. England (*Montreal Medical Journal*, June, 1890) particularly interesting:

The first patient fell a distance of thirty-five feet. There was complete sensory and motor paralysis of the trunk below the arms, and paresis of the upper extremities. The patellar, cremasteric, abdominal, and ankle clonus were absent. There was no deformity of the back. The treatment was palliative. The patient died in two days. The autopsy showed fracture of the sixth cervical vertebra, compression of about half an inch of the cord, separation of the posterior ligament for about an inch, and hemorrhage into the cord.

The second patient fell on the back of the head and neck. The body was paralyzed below the arms, the symptoms were practically the same as in the former case. There was some priapism. On the day following the accident Dr. Bell operated with a view of removing pressure from the spinal cord if such pressure existed. Chloroform was administered to the patient, he was then turned on his face and the seat of operation properly prepared. An incision four inches long was made over the lower cervical vertebræ exposing the spinal processes and laminæ. A fracture of the left laminæ of the fifth and sixth cervical vertebræ was found. The right laminæ were also cut by the bone forceps and the membranes were exposed. These appeared normal. The dura mater was then incised. A considerable quantity of reddish cerebro-spinal fluid escaped.

The cord looked regular on its surface and there was no marked traumatism. The dura was then sutured and the wound was drained and closed. Death followed four days after the injury. Symptoms were but slightly, if at all, bettered by the operation. Post-mortem examination showed a portion of the cord, about three-fourths of an inch long opposite the sixth cervical vertebra, soft to the touch.

The third patient was injured by being caught in the belt of a rapidly revolving wheel. There was sensory and motor paralysis of the whole body below the third intercostal space. In addition to other fractures, including one of the pelvis, marked prominence of the sixth cervical vertebra was found. The following day an operation, similar to that done in the preceding case, was performed. About one inch of the cord substance was found very badly crushed. The wound was closed and drained. The patient lived three days after operation, and died comatose from respiratory failure.

Though neither of these cases was benefited by the exploratory incision, this latter seemed not to complicate the injury in any way. In both the cord was irreparably damaged at the moment of the infliction of the injury.

Iodoform Injections in Cold Abscesses.

Bruns (*La Mercredi Méd.*, April 16, 1890) states that iodoform is not efficacious in the treatment of tubercular ulcerations, because it is carried away by the secretions, and thus prolonged contact with the infected surfaces is not possible.

In cold abscesses, however, this condition is fully realized when iodoform injections are made. It is only after two months that the abscess cavity begins to retract, and the process is not completed for fully four months. As a vehicle olive oil is to be preferred to both ether and glycerin. The favorable action of such treatment is incontestable. Twelve tubercular abscesses

were cured, some of which contained from one to two quarts of pus, and during an observation of four years no case of recidivity was observed. In forty cases of tubercular arthritis this treatment gave a considerable number of apparently permanent cures, and other authors have reported analogous results.

Injection mixtures should contain ten or twenty parts of iodoform. If the disease is in its fungous stage an interstitial injection of four to six cubic centimetres is made. If there are peri- or intra-articular abscesses, these should be evacuated and the cavity should be injected. The preparatory boric acid irrigation, advised by Carousi, is not necessary, nor is immobilization of the joint required, save in exceptional instances. No case of intoxication was observed. These injections should be repeated every two or four weeks, sometimes they should be employed more frequently, an interval of not more than eight days being allowed to elapse between the treatments. As a result there is a rapid amelioration of pain. The purulent collections are at first reproduced but are subsequently absorbed. The fungosity gradually disappears, and, finally, the articulation remains normal and mobile.

Among the cures may be mentioned white swellings of practically all the joints, but particularly of the elbow, the knee, the wrist, and the ankle. Less common is the successful treatment of hip-joint involvement. The more recent the case and the younger the subject the better are the results. Even though a cure is not obtained a decided amelioration is always observed. Want of success in this treatment as applied to joint trouble is more common than is the case in cold abscesses. An extended experience in several large clinics has demonstrated that this treatment should be given a fair trial in the early stages of all white swellings.

Krause states that he has had only 3 failures in 36 instances where the knee was involved, 13 of the hip, 6 of the ankle, 5 of the hand, and 1 of the elbow. Complete cure has resulted, and there has been no return of trouble for one year in 15 of the knee cases, 4 of the hip, 1 of the ankle, and 3 of the hand. Movement was especially well preserved in the knee and the hand. In the hip there was ankylosis, but all of these were well-advanced cases, and might have resulted more favorably had intervention been practised earlier. Trendelenberg has employed this treatment in 130 cases, the injections being repeated at intervals of eight days. The results varied. They were good in the hip and wrist.

The Relations of Subdiaphragmatic Abscess to the Thoracic Viscera.

A paper upon this subject, with a report of three illustrative cases, is contributed by Dr. J. William White (*British Medical Journal*, May 3, 1890).

The author points out the two weak places in the muscular membrane separating the thoracic from the abdominal cavities; anteriorly the space between the margin of the muscular fibres arising from the ensiform cartilage and the adjoining costal cartilages, and posteriorly the space beneath the arch of the internal ligament, under which the great psoas muscle passes. As a result of the anatomical relations of the diaphragm with the serous

membranes placed above and below it, it is by no means uncommon to find suppurative diseases traversing these boundaries, either by means of the weak points already described, or by setting up adhesive inflammation followed by suppuration. Circumscribed peritoneal abscesses frequently occupy the right and left hypochondriac regions, and in a large proportion of such abscesses the corresponding side of the thorax becomes affected. Pleurisy, pneumonia, pleuritic effusions, or empyema, may result, and the case is very likely to be mistaken for one of chronic pulmonary disease, whilst the abdominal trouble is overlooked. Pericarditis may be caused in the same way, though this is much rarer, and for the obvious reason that the opportunity for the spread of inflammation through this membrane by contiguity is less, in direct proportion to the extent of surface involved as compared to the pleuræ. Peri-nephritic abscesses are even more likely than those associated with the liver and spleen to be followed by thoracic symptoms, and this fact constitutes a distinct indication for early operation. The reasons for this liability to thoracic involvement are obvious: the superior portion of the kidney lies upon the diaphragm, the lower margin of which crosses the back of the kidney in a direction obliquely downward and outward. This relation of the diaphragm is also shown by the depression in the kidney, this organ descending nearly half an inch upon deep inspiration. The pleura on the upper surface of the diaphragm is therefore in close proximity to the upper posterior peri-nephritic region, and readily becomes, from contiguity of structure, involved in the inflammation. A case typical of this form of extension is detailed in full. From the development of the peri-nephritic irritation as a sequel to nephro-pyelitis subdiaphragmatic abscess resulted. This, in turn, was followed by localized pleuritis, which, in time, became diffuse, causing complete collapse of the lung. The fact that peri-nephritic abscess originated, in this case, in unmistakable suppuration of the pelvis of the kidney greatly facilitated the interpretation of the clinical history.

In several reported instances the pulmonary involvement has occurred so early, or the previous symptoms have either been so vague and insidious, or so inaccurately observed, that the empyema has been supposed to be the primary disease. In obscure cases it will often be found that a history of flexion of the thigh upon the pelvis, of pain in the loins, or, at least, of distinct lameness about the hip, will indicate the cause of the thoracic disease. Niemeyer has dwelt upon the value of the position of the thigh as evidence of the perforation of the pelvis of the kidney and involvement of the connective tissue. One of Dr. Bowditch's cases strikingly illustrates the importance of these symptoms. He was called to see a patient who was supposed to be dying of phthisis, and who was expectorating large quantities of pus. There was complete dulness over the lower lobe of the right lung with bronchial breathing and coarse râles. The attitude of the patient was peculiar. He seemed to be sitting on one gluteus in order, apparently, to relieve the other. A history of lameness, together with pain in the right loin, of three months' duration, was elicited. The lumbar fold of that side was found obliterated. On this evidence an incision was made, pus was reached, and the patient made a good recovery. It should never be forgotten in such cases that the thoracic complications are not only the most frequent, but also the most

important, coming on in so insidious and latent manner, they should always be sought for, even when the symptoms point exclusively to the abdomen, because the fact of the existence of abnormal thoracic signs has an important bearing on the treatment and prognosis of every case of peri-nephritic abscess. On the other hand, the thoracic symptoms may completely mask the renal.

There are on record several examples of perforation of the diaphragm in an inverse direction—that is, of empyemata becoming subdiaphragmatic or lumbar abscesses. Cases taken from the author's private experience, and collected from the meagre literature of this subject, are detailed in illustration of the statements above cited.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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Laryngectomy.

Dr. Bardenheuer, of Cologne, in an article on Extirpation of the Larynx (*Deutsche med. Woch.*, May 22, 1890), states that but one case out of his first five was saved, the remainder having died between the eighth and fourteenth days or later, from septic inflammation, usually starting at the deepest portion of the wound, in the space between the trachea and the overlying musculature. This was the consequence of failures in antisepsis, either during the operations or in the course of the after-treatment.

In four more recent operations, three complete and one partial laryngectomy, he has pursued a modified plan of preparation, operation, and after-treatment, which has prevented infection from the mouth and from the wound. All four patients recovered, although one of them died of severe bronchial blennorrhœa six weeks after operation, and after the wound had cicatrized. He cleanses the mouth repeatedly for several days before the operation, using the toothbrush, and wiping the mucous membrane with dry salicylated wadding. In operating, he uses the Trendelenburg tampon canula, armed with iodoformed sponge. He makes two large lateral four-cornered flaps to afford free access to the field of operation. The wound cavity is plugged with iodoform gauze. He places the patient in such a position that the head is thrown entirely backward, and the stump of the trachea forms the uppermost portion of the wound cavity, while its triangular base looks upward and backward. The patient lies in a bed made with a mattress in three portions. The upper portion is removed and the patient's head sinks down in the space it occupied, the shoulders striking the upper portion of the middle section of the mattress. In this manner the secretions can neither accumulate in the neighborhood of the trachea nor enter it. Furthermore, he forms a partition wall between the

mouth and the wound cavity, covering the latter as a roof. He takes care to spare as much as possible the anterior wall of the œsophagus and the mucous membrane underneath the epiglottis; and after completing the operation he stitches the edges of this spared mucous membrane underneath the epiglottis to that of the anterior wall of the œsophagus from before backward, even cutting the epiglottis somewhat at its free border and stitching the edges of the wound to those of the œsophagus. This cuts off the cavity of the wound from that of the mouth, and from particles of food. The cavity of the wound is firmly plugged with sterilized gauze, and the patient is first bandaged at a period varying from two to eight days, often only after the entire cavity is covered with good granulations. The time for changing the dressing depends chiefly on the holding of the stitches. If they hold well, a change will not be necessary for eight days. The advantage of this procedure is that the patient can swallow from the first, and does not require to be fed with a tube. At the end of fourteen days, if the stitches have not given way spontaneously they can be removed. In one instance it was found necessary to reëstablish artificially the communication between the mouth and the cavity of the wound. After removal of the stitches, the two lateral flaps can be replaced.

OBSTETRICS.

UNDER THE CHARGE OF

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PROFESSOR OF OBSTETRICS AND DISEASES OF CHILDREN IN THE PHILADELPHIA POLYCLINIC; VISITING OBSTETRICIAN TO THE PHILADELPHIA HOSPITAL.

Three Cases of Ectopic Gestation.

Duncan (*Lancet*, March 1, 1890) reports a case of tubal gestation of the left side in which rupture occurred between the layers of the broad ligament. On admittance to hospital the patient's temperature was 101.8°; she was too ill to give a clear history. On examination a firm swelling was found to the right of the linea alba, extending nearly to the umbilicus, its lower end in the pelvis; to the left of the linea alba was the bladder, and on deep palpation a firm mass was felt in the left half of the pelvic cavity. On internal examination a swelling filled up Douglas's cul-de-sac; the patient became extremely ill, her temperature rising to 103°. On abdominal section ruptured tubal gestation in the left broad ligament was found; the tumor was adherent to the omentum, intestines, and pelvic wall. The patient collapsed, and the uterus, ovaries, and tumor were rapidly removed. The patient, however, survived the operation but a short time; the left tube had contained a gestation sac which had ruptured into the broad ligament.

His second case was right tubal gestation, in which examination showed a firm mass in the region of the broad ligament. On abdominal section the pelvis was found filled with blood; the right ovary and tube were separated

from adhesions; the tube had ruptured; the broad ligament was transfixed and the ovary and ligament removed; clots were emptied and the abdomen closed.

Examination of the specimens demonstrated the rupture in the tube, and also the fœtal membranes and the enlarged ovary; two pints of blood were removed. The patient's convalescence was disturbed by a mass at the right of the uterus, which gradually disappeared.

A third case is reported, in which an abdominal tumor was found, which presented, on auscultation, a bruit; on abdominal section a small tense cyst was found to the left of the uterus between the layers of the broad ligament; this cyst extended to the pelvic brim, to which it was adherent, and contained a fœtus ten and a half inches long. Profuse hemorrhage occurred from the incision in the cyst wall; the edges of the opening were sutured to the lower end of the abdominal incision, and a drainage-tube inserted; sponges wrung out of vinegar and water were passed into the cyst to stop hemorrhage. On one occasion, after dressing the cyst, profuse hemorrhage occurred, which was stopped by the injection of iron. The umbilical cord, with pieces of placenta, was gradually removed, and the rest of the placenta followed. The patient had a long and tedious convalescence. The retained placenta decomposed very offensively, and her recovery was further complicated by a fæcal fistula at the upper portion of the cyst. Recovery finally occurred with closure of the fistula.

Duncan would open the abdomen for all cases of ectopic gestation except those in which rupture has occurred in the broad ligament. If the fœtus dies, and the tumor becomes encysted, hemorrhage does not occur, and it is finally absorbed.

Eight Cases of Ectopic Gestation Treated by Laparotomy.

Olshausen (*Prager medicinische Wochenschrift*, No. 8, 1890) reports eight cases of ectopic gestation in which he operated by laparotomy as follows: The first was ectopic gestation, fœtus perished at seven months, the mother suffering from fever, the diagnosis plain; the fœtal sac was stitched to the wall of the abdomen, and the placenta separated, when hemorrhage occurred necessitating the immediate use of the tampon; eleven days afterward the placenta came away without hemorrhage; the sac rapidly closed with suppuration.

In the second case, the fœtus died at eight months; operation was delayed ten weeks afterward, the sac stitched to the abdominal wall; the placenta separated spontaneously, was very thin and widely spread out, and its separation was very tedious.

The third case came under treatment four months pregnant, and a diagnosis of ectopic gestation was made. Laparotomy was performed fourteen days before the end of pregnancy; the sac was sutured; the living child removed, but perished an hour and half later of exhaustion. The placenta was left, and separated thirty-four days afterward. Recovery was complicated by eclampsia, which was found to be a psychosis lasting fourteen days. This was followed by a brief period of unconsciousness; capillary embolism of the lungs also occurred, from which the patient recovered. Six weeks before

the termination of pregnancy a discharge from the vagina had persisted; this was diagnosed as amniotic liquid which flowed through the median portion of the Fallopian tube; this diagnosis was confirmed at the operation by an entire absence of amniotic liquid; as a consequence the delivery of the child through the uterine incision was as difficult as in a case of highly contracted pelvis. This is the only case on record where such discharge of amniotic liquid has been observed.

In the next case pregnancy was at fourteen months; the fœtus four months dead, diagnosis was difficult and uncertain; laparotomy was made and the fœtus removed. The patient had fever in the second week, and a recto-vaginal fistula formed which soon healed spontaneously.

The fifth case was operated on shortly before the end of pregnancy; the fœtus could be outlined, but no fœtal sac demonstrated. In a few days the contour of the abdomen changed greatly; it became wider in its transverse diameter, caused by rupture of the fœtal sac; six days afterward laparotomy was performed. On opening the abdomen the fœtus was found at the posterior wall of the abdomen, living and lying loosely among the coils of the intestines; the child was strong and lived and thrived The same woman had been operated upon by Olshausen before for ectopic gestation in the left tube. The fœtal sac and placenta were upon the broad ligament; they were tied off *en masse* by three ligatures and removed; recovery followed.

The sixth case was laparotomy at twelve months pregnancy; the fœtus dead four months; extirpation of the sac; recovery.

In the seventh case the diagnosis was incorrect; a tumor was found on the right side of the uterus, and thought to be a foreign growth; the patient was excessively debilitated. On laparotomy, the fœtal sac burst, and a six months fœtus was removed; the sac was extirpated and recovery followed. The fœtus had died five months previously, and the history was most confusing.

The last case was pregnancy at ten months, the fœtus dead ten weeks. The fœtal sac was found ruptured and in halves, one containing the fœtus, the other the placenta, which was heavier and larger than the child. Both halves were extirpated. The child was not decomposed although dead ten weeks.

The first three cases were treated by suturing the sac to the abdominal wall, leaving the placenta twice, removing it once.

In the five other cases, the sac was extirpated with or without the placenta; serious hemorrhage was never observed.

Olshausen describes two cases of sudden death caused by rupture of the fœtal sac. When the sac is not intra-ligamentous, it should be extirpated without waiting, but as soon as a diagnosis is made. When suppuration has occurred in the sac, it should be stitched to the abdominal wall, disinfected, and tamponed if necessary; such suppuration is generally caused by micro-organisms from the intestinal canal. If the sac cannot be extirpated, the placenta is so situated that there is risk of its infection by microörganisms from the intestinal canal. In the treatment of lithopædia, when complete calcification of the fœtus has occurred, there is little danger of suppuration; until, however, this process is complete, suppuration may occur at any time, no matter how long the case has persisted, the fœtus should be removed.

Thrombus of the Vagina during Labor in a Hæmophiliac, with Pulmonary Embolism.

Loviot (*Bulletins et Mémoires de la Société Obstétricale et Gynécologique de Paris*, No. 4, 1890) reports the case of a woman delivered of her second child who had a family history of hæmophilia; her labor, which was normal, was terminated by an easy application of the forceps, and the delivery of a living child. Hemorrhage followed delivery, although the uterus was well contracted.

On examination a vaginal thrombus was found the size of half an orange at the right side, and a little behind the cervix uteri; a sensation of arterial pulsation could be distinctly obtained from the thrombus; twenty-five days after labor the patient was taken with symptoms of pulmonary embolism, rapid small pulse, short and frequent respiration without physical signs of pneumonia. The patient had against orders left her bed and had moved about rapidly for a short time; she was put immediately at absolute repose, given inhalations of oxygen, stimulants and dry cups; symptoms of pneumonia complicated by pleurisy subsequently appeared, from which the patient gradually recovered. Two months after delivery she was in fair health with only a slight scar at the site of the thrombus.

Hemorrhagic Metritis, Retention of the Placenta for Six Months.

De Lostalot (*Nouvelles Archives d'Obstétrique et de Gynécologie*, December 20, 1889) reports the case of a woman who had suffered for six months after an abortion from hemorrhagic metritis; on examination the cervix was found congested without cervical metritis; the body of the uterus was in normal anteversion, but enlarged and softened; after the use of the curette a number of spongy fragments were removed, which, upon microscopic examination, were found to be a placenta corresponding to the period of the abortion: six days after emptying the uterus, the patient had a rise in temperature which yielded promptly to intra-uterine injections of bichloride of mercury.

In addition, Chaput (*Ibid.*) reports two cases of adherent placenta, in one of which the placenta remained two months in the uterus; in the other the fœtus and its appendages were retained two months; in each case artificial removal was resorted to. Upon microscopic examination of the specimens, the tissue of the placenta was found sclerotic with patches of hemorrhagic infiltration; the number of villi was considerably reduced, although the volume of each villus was greatly enlarged; at the periphery of the villi a circle of small epithelial cells was found with small nuclei; there was no trace of bloodvessels in this tissue. The great mass of placental tissue was formed by fibrous connective tissue staining imperfectly with picro-carmine; in the villi the cells were elongated with small nuclei and stained poorly; they resembled most atrophic cartilage cells found upon foreign bodies free in the joints; in the large villi were found masses of very large cells resembling decidual cells; they stained feebly a rose color, and were granular in appearance; blood was also found in the dilatations of the bloodvessels. The conclusion is reached that after abortion, the fœtus expelled alive, the placenta may continue to live; the bloodvessels are gradually obliterated and

replaced by connective tissue; atrophy of the cellular elements ensues; when this tissue of low vitality perishes either hemorrhage or septic infection is apt to occur.

Horse-shoe Kidney in the Newborn Infant.

Arbel (*Bull. et Mém. de la Soc. Obstét. de Paris*, No. 4, 1890) reports the case of a prematurely born child at seven months, in which upon post-mortem examination a horse-shoe kidney was found reaching as low as the border of the second sacral vertebra; the kidney had two ureters which led in the usual manner to the bladder.

The Reporter, in a recent post-mortem upon a young infant, found a kidney similar to that described by Arbel. In this instance, the vinculum connecting the two halves of the kidney was as wide as either of the halves, and the organ was composed of three lobes, two representing the kidney as usually found, and the third the vinculum between the two halves; two ureters were present, as in Arbel's case.

Induced Abortion at 132 Days' Pregnancy, for Pernicious Vomiting; Recovery.

Loviot (*Bull. et Mém. de la Soc. Obstét. de Paris*, No. 1, 1890) reports the case of a primipara, aged nineteen years, pregnant between four and five months, in whom all methods of treatment failed to stop pernicious vomiting; the patient was fed for six weeks by rectal injections, her temperature remaining slightly below the normal, her pulse was above 120; abortion was produced by the introduction of a bougie into the uterus which resulted in the expulsion of the fœtus and appendages. Shortly after delivery the patient enjoyed and retained a meal of beefsteak and potatoes.

Dextro-torsion of the Pregnant Uterus Simulating Extra-uterine Pregnancy.

Wenning (*American Journal of Obstetrics*, No. 2, 1890) reports a case presenting the clinical signs of an ovarian or abdominal pregnancy with discharge of membranes from the uterus. The sound was repeatedly passed into the uterus, which seemed empty. Fœtal heart sounds were heard in the tumor, which was at the right of and below the umbilicus. Efforts were made to destroy the fœtus by electricity and aspiration of the liquor amnii, but without success. As vomiting, pain, and prostration continued, relieved only by morphine, laparotomy was done, when a pregnant uterus at six months was found strongly twisted to the right. The left tube was much enlarged, swollen, and dark. Premature labor followed, and death from septic peritonitis. An old inflammatory band was found passing from the cæcum to the small intestine, on post-mortem examination.

A Case of Fibrinous Pneumonia of Congenital Origin.

Levy (*Journal des Connaissances Médicales*, January, 1890) reports the case of a woman, aged thirty years, who had died of double fibrinous pneumonia complicated by pleurisy and pericarditis. The chest was aspirated, and a

sero-purulent fluid removed which gave cultures showing the diplococcus of Fränkel and Weichselbaum. Inoculations were made with this fluid, which demonstrated the presence and potency of the germ. The child of this woman, born thirty-six hours before its mother's death, died two days after birth of hemorrhagic catarrhal pneumonia with lobar fibrinous pneumonia, and the autopsy demonstrated the fact that the pneumonia from which the child died was infectious, and had persisted for at least thirty-six hours before the child was born. Cultures made with fluid removed from the left ventricle of the heart, and from the right lung, demonstrated the presence of the diplococcus; the microörganisms were especially numerous in the blood, and the conclusion is drawn that the infant became infected from the mother's pneumonia.

The True Conjugate Diameter of a Contracted Pelvis Varies with the Posture of the Patient.

Walcher (*Centralblatt für Gynäkologie*, No. 51, 1889) has found in examining a number of contracted pelves, that when the patient is placed upon the back, the upper portion of the body elevated as little as possible, the thighs flexed upon the abdomen, the promontory of the sacrum is easily reached; by an examination with the finger in these cases, the antero-posterior diameter measured less than four inches; but if a cushion be placed under the sacrum, and if the thighs were extended upon the table, it was found that an increase in the antero-posterior diameter occurred, which, although slight, was sufficiently great to be an important factor in difficult labor. The explanation of this phenomenon is supposed to be the mobility of the sacral joints during the latter portion of pregnancy.

GYNECOLOGY.

UNDER THE CHARGE OF

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Vaginal Fixation of the Retroflexed Uterus according to Schucking's Method.

Debrunner (*Correspondenzblatt für Schweizer Aerzte*, June, 1890) reports twelve cases in which he performed this operation. The uterus was movable in each instance, but it was impossible to retain it in position by a pessary. The operation was followed by no bad results, except in two cases in which the bladder was punctured, when temporary hæmaturia and vesical tenesmus were noted. Eight patients were cured, one having since borne a child at full term; in four cases there was no result whatever, and in four others the displacement recurred within a few weeks. Three cases of ventro-fixation

were successful. Both methods have their proper place, the former being unsuited for those cases in which the uterus is large and heavy. The advantage of the vaginal operation is that there is a minimum of pain and danger, and the patient is confined to her bed but a short time, being able to return to her work at an early day.

Papilloma of the Fallopian Tube.

Doléns (*Revue Obstétricale et Gynécologique*, May, 1890) describes a specimen of this rare disease, which he removed by laparotomy, which gave rise to a peculiar clinical symptom—periodical hydrorrhœa of undoubted tubal origin. Anatomically the growth appeared to be a pure papilloma of a benignant character, due to chronic inflammation of the tubal mucosa.

Laparotomy in Trendelenburg's Posture.

In a letter to the *Archives de Tocologie* Veit states that he has during the past two years invariably placed his patients in this position during laparotomy. The advantage obtained is unusual clearness of the field of operation, since the intestines gravitate downward toward the thorax, while intrapelvic tumors in their turn become more accessible to the operator. The writer has never seen disadvantage from the peculiar position in the way of interference with respiration. In general, the duration of his operations has been much shortened since he adopted this method.

The Local Treatment of Chronic Endometritis.

Dumontpallier made a further communication to the Académie de Médecine on this subject (*L'Abeille Médicale*), his conclusions being as follows:

1. The best method of treating chronic endometritis is to introduce a pencil of chloride of zinc into the uterine cavity, where it is allowed to dissolve.
2. No inflammatory complications result from this treatment, and the pain is not insupportable.
3. The endometrium is soon restored after the operation, and normal menstruation returns within a few weeks.
4. By systematic dilatation stenosis can be prevented.

The Treatment of Prolapsus Uteri by Brandt's Method.

Braun and Kreissl, in a recent monograph on pelvic massage (abstracted in *Frauenärzt* for May, 1890), report fourteen cases of prolapsus treated by this method, with four cures. They call attention to the cause of failure in the unsuccessful cases, which they attribute rather to injury of the pelvic floor than to relaxation of the so-called ligaments of the uterus. In order to obtain permanent relief from pelvic massage it is necessary that the pelvic floor should be only relaxed, without having lost its tone, and that the vaginal walls should be normal, hence in old patients whose muscles are completely atrophied, a favorable result cannot be expected. If the muscles are felt to contract during the movements, a good prognosis can be given as regards permanent restoration of the uterus to its normal position. Laceration of the

perineum, pelvic inflammation, and exudates and tumors are absolute contra-indications so far as the treatment of prolapsus is concerned. The writers speak highly of the value of massage in the treatment of pelvic exudates, reporting twenty-four cases with twenty cures.

One Hundred Aseptic Laparotomies.

Phenomenov reports one hundred cases of laparotomy performed by him during the scholastic seasons of 1887, 1888, to March 3, 1890.

The causes of operations were—

Ovarian cysts	47
Tubo-ovarian cysts	2
Cysts of broad ligaments	6
Diseased tubes, tubes and ovaries, perisalpingitis, and perioöphoritis	9
Malignant neoplasms of ovaries	6
Swelling of ovaries	3
Myoma of uterus	17
Myoma and cancer of uterus	1
Swellings outside of genital sphere	3
Irreducible hernia of the cord (navel, in a newborn child one hour old)	1
Extra-uterine pregnancy	3
Pregnancy in horn of uterus	1
Complete prolapse of uterus	1

The following operations were performed:

Ovariotomy	61
Single 22, double 39	
Removal of appendages	15
Single 12, double 3	
Myomotomia	10
Extrauterine pregnancy	3
Complete removal 2, partial 1	
Amputation of gravid uterus	1
Excision of hernia in newborn	1
Colpolaparohysterectomia	1
Ventro-fixation (and removal of appendages)	1
Removal of cyst of mesentery	1
Removal of cyst of echinococcus	1
Exploratory	6

The heaviest weight of removed parts was 140 pounds (Russian weight).

The largest circumference of abdomen 152 cm.

Duration of operation: longest 1 hour 45 minutes; shortest 9 minutes (ovariotomy).

Ages: oldest 65 years; youngest 8 years; and one hour.

Five deaths.

After the removal of ovaries and appendages menstruation continues in

some even with the same regularity as before the operation. Several of the patients were under observation of the author for two years.

All operations in pregnant women were not followed by any complication. Pregnancy continued, and the labor was normal. (Author received several letters from patients to this effect.)

Several operations were followed by acute bronchitis on the second day, which ran its course without fever. The author does not ascribe it to the laparotomy proper, but to the effect of chloroform over the respiratory organs, as several cases of bronchitis followed other operations where prolonged narcosis was needed.

Mistakes in diagnosis: Myoma lymphangiectodes was diagnosed as ovarian cyst. Ovarian fibroma was mistaken for a doubtful ovaritis or dermoid cyst. Pregnancy of horn of uterus was mistaken for extra-uterine.

From January 1, 1889, all operations were conducted without the use of antiseptics (83 cases). Sponges, instruments, silk, towels, etc., were boiled in distilled water. Only two sponges were used, one for operator and the other for assistant; when they got soiled they were washed in hot water from a boiling samovar.

Hands of operator and assistant, and abdomen of patient, were cleaned with soap, brush, and hot water. Just before the operation the field was washed with ether.

The absence of fever, the healing of the wound, and the absence of any irritation, prove that the operation was thoroughly aseptic. The sponges and the silk were subjected to a bacteriological examination, and were found free from bacteria.

"The idea of performing laparotomy only aseptically occurred to me long ago—indeed, when I first undertook the operation. To tell the truth, the first aseptic operations were performed secretly; not even all the assistants were aware of it. This was done, of course, not for fear of censure, but with a view not to discredit this mode of operation, should the first attempts prove unfavorable. Surgical operations are so intimately connected with antiseptics in the mind of the profession, the more so in such dangerous operations as laparotomy, that it was difficult to expect any welcome to a new method which intruded into the realm where antiseptics reigned supreme."—*Vratch*, Nos. 16, 17, 18, and 19, 1890.

Papilloma of the Peritoneum.

Sutugin (*Centralblatt für Gynäkologie*, June 7, 1890) calls attention to the difficulty of distinguishing this condition clinically from cancer and tuberculosis of the peritoneum, which are also accompanied by chronic peritonitis and ascites. The absence of distinct, hard nodules, and the uniform induration of the vaginal vault, point rather to papilloma. Coblenz has noted a peculiar rubbing sensation on palpating the abdomen, though this appears to be more characteristic of a papillomatous cystoma rather than of peritoneal outgrowths. As the latter are secondary, and are of themselves not so prone to proliferate, the removal of the parent cyst and of a portion of the peritoneal masses, offers a fair prospect of cure, and seems to show that, at least

clinically, there is some doubt if true papilloma should be included in the same class with sarcoma and carcinoma.

Emissions in the Female.

Robinson (*Med. Age*, 1890, No. 7) calls attention to the fact that under the influence of erotic dreams there occurs a profuse secretion from Bartholin's gland which is similar to nocturnal emissions in the male. The patient after such a discharge frequently awakens in the morning with backache and a feeling of malaise. At the moment of emission there may be a painful spasm of the constrictor cunni muscle. Self-abuse, imperfect coitus, sudden suspension of sexual relations (as in young widows) are the usual etiological factors. If the emissions continue the patient becomes neurasthenic. The treatment consists in improving the general condition, toning up the nervous system, and regulating the sexual hygiene.

PÆDIATRICS.

UNDER THE CHARGE OF

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Sterilization of Milk.

Chapin (*Medical Record*, June 21, 1890). The method of sterilizing, as between boiling and steaming, is a point of some interest. Prolonged boiling of milk, while destroying the germs, produces other changes, such as the formation of a scum in contact with air, consisting of coagulated albumin with a small modicum of fat. According to Dr. Townsend, boiling expels about three per cent. of CO_2, N and O, which may explain the flat taste of milk so heated. Sterilization by steam appears to be more thorough and complete than that effected by boiling in water. For the past year, Dr. Chapin has used the "Arnold" steam cooker, with much satisfaction. The printed circulars advise that the milk be heated from 30 to 45 minutes. This is too short a time; fully an hour and a half is needed to keep milk sweet for any length of time.

Dr. Chapin's experiments showed that the prolonged heat necessary for thorough sterilization has a tendency to cause the coagulation of the casein to take place in smaller clots and thus more closely resemble that of mother's milk.

Adenoid Tumors of the Naso-pharynx in Children.

Chaumier (*Le Concours Méd.*, March 22, 1890). In children seven or eight years of age these tumors are of frequent occurrence. At the age of eighteen

or twenty they tend to disappear spontaneously. They are not due to scrofula, and it is questionable whether microörganisms have anything to do with their causation. On this latter point nothing definite is known. It is possible that heredity may have something to do with their etiology. Of 232 cases which the author had seen, the ear was affected in 31, and manifest deafness was present in 24 of that number. In 9 there was chronic otorrhœa, and in 9 others a catarrhal discharge. The author feels that deafness in children, in general, may be associated with adenoid growths, and the same is true of most of the chronic catarrhs of childhood. Mouth-breathing is another symptom in such cases, which is frequently observed. Other symptoms are arching of the palate to an unusual extent, and thickness of the upper lip. In 75 of the cases seen by the author, the tonsils were sufficiently large to require excision. In 28 cases there were large adenoid granulations on the bucco-pharyngeal mucous membrane. In 16 the cervical glands were enlarged. Respiration was constantly interfered with from nasal obstruction, with hypersecretion of mucus. There are three forms of complication to which too little attention has heretofore been given, namely, laryngo-bronchial accidents, nocturnal terrors, and angina. In cases in which cough is a symptom, there may also be paroxysms of suffocation of asthmatic character, which are especially prone to occur at night. Nocturnal terrors in these cases are the result of respiratory trouble during the hours of sleep. Angina is very common, but is often so mild as to escape the attention of parents. Adenoid tumors may be of grave significance, since they may lead to loss of hearing, arrest of intellectual development, and deaf-mutism. They may even cause death by the propagation of purulent inflammation from the ear to the brain. Bronchitis is frequently due to this cause. Such tumors should, therefore, be sought for in all children who are mouth-breathers; in those who have catarrhal discharges from the ear; in those who are deaf; in those whose articulation is defective; in deaf-mutes, idiots, and backward children; in those who are subject to bronchitis and asthma; and in those who suffer from nightmare. Posterior rhinoscopy will reveal the presence of the tumors, and digital examination of the naso-pharynx will enable one to feel them. With very young children, however, rhinoscopy will be difficult or impossible. The treatment consists in the destruction of the tumors with cutting forceps or adenotomes, or they may be scraped away with the finger or curette. The nasal douche may also be used, especially if there is trouble with the Eustachian tubes. During the night after the first treatment it is not unusual that there should be paroxysms of cough or suffocation.

Clinical Observations on the Treatment of Rhachitis with Small Doses of Phosphorus.

Mandelstamm (*Jahrb. f. K.*, xxx. 4). The following conclusions are offered:

1. Clinical observation justifies the treatment of rhachitis with small doses of phosphorus.

2. Phosphorus acts upon the rhachitic process better, quicker, and more safely than any other agent.

3. The use of phosphorus in small doses for a long period of time is well tolerated by children, and causes no perceptible disturbance.

4. Phosphorus acts satisfactorily upon the nervous disorders which accompany rhachitis, such disorders disappearing quickly, and the general condition improving rapidly.

5. Periodical measurements and weighings of rhachitic children treated with phosphorus, as well as investigation of the condition of the bones, show that under the influence of this agent the rhachitic process usually ceases to progress, the disease gradually disappearing.

Influenza in Children.

Kormann (*Wien. med. Blätter*, Nos. 51 and 52, and *Rev. Mens.*, April, 1890). There are certain essential differences in the symptoms of this disease as it appears in children from that form which is seen in adults. With children fever and cerebral symptoms at the beginning of the disease are of primary significance. Rudimentary forms may be manifested by general malaise, lassitude, want of activity, and disinclination to play. In well-developed cases the disease usually begins abruptly the same as in adults, but instead of well-marked chills there are usually only chilly feelings alternating with feelings of heat. The chilliness may be accompanied with convulsions, and the latter be succeeded by drowsiness which may last twenty-four hours or more. When very young children have this disease they are apt to be fretful and complain whenever any change is made in their position. Older children complain of pains in the head, the lumbar region and the limbs, and there may also be intense mental dulness, which may even extend to loss of consciousness. Other symptoms are loss of appetite, paroxysms of cough, vomiting, or diarrhœa. In grave cases death may occur within forty-eight hours. In the majority of cases the pathological process is limited to the mucous membranes, the respiratory passages being first attacked, after which may follow conjunctivitis, epiphora, difficulty in deglutition, deafness, and possibly cough. In very young children there may be dyspnœa of an alarming character. There is usually swelling of the cervical ganglia. Psychical excitation characterizes some cases, while with others there is depression. The nervous symptoms are apt to improve after three to six days. A crisis in the disease may be marked by sweating, and instead of the dry cough there may be expectoration of mucus. Convalescence is slow, lasting eight or ten days. Complications during the disease, or during convalescence, are more common in children than in adults. There may be chronic bronchitis, caseation of the bronchial glands, acute miliary tuberculosis and tubercular meningitis. Of the acute complications the most common are pneumonia and croupous bronchitis, which are ushered in by chills, and sometimes by convulsions in addition. The mucous membrane of the nose is usually hyperæmic, and may have a grayish deposit adherent to it. The same condition may involve the entire bucco-pharyngeal mucous membrane, and may even extend into the bronchi. There is rarely any extensive morbid change in the organs of the digestive apparatus, but a catarrhal swelling of the mucous membrane of the stomach is common enough. There may also be swelling of Peyer's patches and the closed follicles. The spleen is usually not swollen. Disorders of the nervous system are more marked with children than with adults in this disease. The hyperæmia of the Schneiderian mem-

brane may be responsible for severe pain in the head. Hyperæsthesia may be present upon the face or scalp, or it may include the entire surface of the body. There may be local or general convulsions and trembling of the tendons and of the extremities. Cutaneous phenomena may be urticaria, the exanthem of scarlatina, rubeolous spots, and erythemata due to vasomotor trouble. Dyspnœa may be intense, and not related to lesions of the bronchi, but to neuroses of the bronchial muscular fibres and the diaphragm. It may be of a paroxysmal, intermittent character, perhaps amounting to orthopnœa, with intense præcordial anxiety. In some cases there is a predominance of gastro-intestinal troubles. The prognosis will vary with the character of the epidemic, but it may be considered grave, in general, for young infants. The treatment should be symptomatic, especial attention being paid to the general condition, and to the relief of catarrhal difficulty.

Hemiplegia in Children in connection with Pneumonia of the Apices.

Aufrecht (*Rev. mens. des Mal. de l'Enf.*, May, 1890). Two cases of this character were observed. The first occurred in a boy fifteen months old, the upper lobe of the right lung being affected. On the eighth day there was a right hemiplegia, which disappeared entirely in fifteen days. The second case was in a girl two years and three months old, the pneumonia involving the left apex. There were severe convulsions at the beginning, which were followed by hemiparesis of the entire left side, but the paralysis lasted only a few hours. Lepine believed that pneumonic hemiplegia occurs almost exclusively among the aged, and he attributes it to an atheromatous condition of the vessels, the paralysis being consecutive to ischæmia of the central nervous system. Atheroma of the cerebral vessels may predispose to the ischæmia, and also reflex action proceeding from the pneumonic process in the lung. Stephan has seen pneumonic hemiplegia in those whose arteries were not atheromatous, hence atheroma cannot be a universal cause. If there is no anatomical change in the brain and meninges, he believes that the hemiplegic pneumonia, in the form of uræmic paralysis, develops under the influence of a toxic substance which, joined to the reflex action proceeding from the diseased lung, causes ischæmia of the nerve-centres, by acting on the vasomotor nerves. Aufrecht thinks that pneumonic hemiplegia in children is due to œdema of the brain and meninges.

Pericarditis in Childhood.

Knoff (*Rev. mens. des Mal. de l'Enf.* April, 1890). The author's report includes 10 cases of pericarditis in children. Of these 10 there were 3 under one year of age, 3 between one and two, and 4 between six and ten. Pericarditis in the newborn is usually due to a septicæmic process, which starts from the maternal organism, or else from the umbilicus of the child. Of the chronic diseases which predispose to pericarditis, tuberculosis is a good illustration, as are also all the inflammatory processes of the pleura, lungs, sternum, vertebral column, bronchial and mediastinal glands, thymus, and œsophagus. Pericarditis may also follow inflammation of the abdominal

organs and the peritoneum. In six of the author's cases the disease followed inflammation of the pleura and lungs, in one it followed chorea, in two scarlatina, and in one the cause was not ascertained. In very young patients there is often an absence of the ordinary physical signs which reveal the disease in the adult, including weakening of the heart-sounds and increase in the area of cardiac dulness. In fact the disease may develop without any appreciable symptom. Autopsies made by the author showed that the exudation was usually not abundant, and hence it could not influence the position of the heart, the area of dulness, or the relative position of contiguous organs. The exudation was also fluid in character, without fibrinous deposit, and hence the absence of friction murmurs. In older children the diagnosis is also a matter of difficulty, and when pericarditis is suspected an examination should be made every day, to observe the slightest modifications which may occur in the physical signs. The earlier in the case a diagnosis is made the more favorable will it be as to treatment. Among the unfavorable complications may be mentioned adhesion together of the two layers of the pericardium, for paralysis of the cardial muscle will result with extensive dropsy. Symptoms of this form of cardiac paralysis are small and frequent pulse, subnormal temperature, œdema of the cheeks, lids, and lower extremities, and albumin in the urine.

Diabetes Mellitus in Children.

Stein (*Arch. f. K.*, xi. 5 and 6). The recorded cases of this disease in children are not numerous. The author could find only 117, and 75 of these were published subsequent to 1876. An analysis of these cases showed the importance of heredity from an etiological standpoint, the parents being either diabetic or neuropathic. The influence of other diseases was seen in the fact that the diabetes was complicated by gastric catarrh, morbus maculosus Werlhofii, typhoid, malaria, measles, and furunculosis. The causative influence of a starchy diet, exposure to cold, and concussion of the brain, was noted in some of the cases. The initial symptoms varied; in fact, the beginning of the disease was seldom observed. In some instances there was emaciation, peevishness, enuresis, or intense hunger. Polyuria was the principal symptom, and the quantity of urine passed was sometimes enormous. The specific gravity varied from 1008 to 1042, and the quantity of sugar from five to ten per cent. Other symptoms which might be added were weakness, sweating, nosebleed, furuncles, abscesses, and cataract. As might be expected, the digestive organs gave marked evidence of the drain to which they were exposed. The patients exhaled a characteristic odor of vegetables, apples, or wine, and in some cases there were carious teeth, loss of appetite, vomiting, constipation, or diarrhœa. Death resulted in those cases in which the respiratory organs became affected. Nothing definite could be concluded from the pathological anatomy. The duration of the disease varied from two days to five years. In 6 cases the disease was fatal in a month, in 17 within a year, in 10 it continued more than a year, none of the cases being cured. Of 70 cases there was recovery in 14, improvement in 4, and death in 52. The regulation of the diet forms the most important feature of the treatment. Sour milk, to which glycerin and mannite were added, with three parts of

boiled water to one of milk, was given to nursing-infants with satisfactory results, the sugar disappearing permanently from the urine. The diet for older children was limited to soup, roast meat, raw eggs, cheese, and sour milk, sugar and starchy food being prohibited. Cod-liver oil and iron were also given with satisfaction. The alkaline carbonates were found serviceable, also large doses of mineral acids, which were given before breakfast and dinner. To the foregoing list of medicinal agents might be added the acetate and sulphate of iron, and salicylate of soda.

Purpura.

Von Dusch (*Rev. mens. des Mal. de l'Enf.*, May, 1890). The author is in accord with Henoch in regarding purpura as a distinct disease. He has seen about thirty cases in children, most of whom were two or three years of age, in bad hygienic surroundings, and badly nourished. Medical aid was summoned for most of the patients on account of profuse nosebleed, the nasal cavities requiring tamponning. The ecchymoses were well marked from the beginning, and were usually disseminated over the entire body with the exception of the face and hands. Purpuric spots were of frequent occurrence upon the bucco-pharyngeal mucous membrane. The disease lasted one to three weeks, and always resulted in cure.

Rheumatic purpura is a distinct form of the disease, and occurs in successive attacks, which are separated by remissions during which the patient may appear perfectly well. The spots in this variety appear upon the extremities, especially the lower ones. The duration of this variety is from a few weeks to as many months. There may be three subdivisions: First, that in which there are joint affections, some of the joints being painful or swollen; second, that in which there is concomitant intestinal disorder, in the form of colic, bloody vomiting, intestinal hemorrhage, but no articular symptoms; third, that in which there are both intestinal disorder and articular lesions. This variety of the disease may terminate fatally. In purpura hemorrhagica there is a change in the blood, in rheumatic purpura the symptoms are due to embolic processes.

The Treatment of Intussusception.

Brinton (*Arch. f. K.*, xi. 5 and 6). The author has collected from various sources 500 cases in which there was fatal intestinal obstruction, 215 of them being due to invagination of the intestines. The methods which are commonly used for the relief of this trouble consist in the introduction into the bowel of an elastic bougie, as far as may be necessary or suitable, the injection per rectum of a large quantity of hot water, or the injection of air. The latter method has frequently been tried in children, and has frequently been successful, especially if an anæsthetic has been used as an adjuvant. Operations of this character must neither be of too long duration, nor should they be attended with much violence. It may be necessary to repeat the operation several times, and the possibility of rupturing the intestines must ever be considered.

Barker has collected 63 cases in which laparotomy was performed on

account of intestinal obstruction, and in 34 of them relief was obtained. This operation must be performed early in order to be successful, though Carver has reported a successful case in which the diseased condition had lasted seven weeks at the time the operation was performed.

Digestive Disorders in Children, and the Diagnosis of the Same.

Moncorvo (*Arch. f. K.*, xi. 5 and 6). The author concludes his paper in the following propositions:

1. Disorders of digestion in children are very common in Brazil.
2. The high temperature of tropical climates during the long summer tends to the frequent development of gastric disorders in children, and this may be more or less influenced by the excessive sweating which the heat insures.
3. Gastro-intestinal diseases often coexist with dilatation of the stomach in children more than two years of age.
4. In children under two years of age defective gastric digestion is usually caused by diminution or absence of free hydrochloric acid in the gastric juice.
5. In the subsequent years of life cases sometimes occur in which there is excess of acid in the stomach, but, as a rule, there is a deficiency, or a want of it, in dyspeptic children.
6. The remedy for deficiency in the supply of acid in the gastric juice consists in the proper use of hydrochloric acid.

Pathology and Treatment of Tumors of the Lymph-glands of a Scrofulo-tuberculous Character.

Wohlgemuth (*Arch. f. K.*, xi. 5 and 6). The author's paper concludes as follows:

1. Tubercular disease of the glands is very common during the first ten years of life.
2. The glands of the neck are involved in the majority of cases of this disease.
3. The susceptibility of boys and girls to this disease during this period seems to be about the same.
4. The prognosis of tubercular disease of the glands in young children is generally better than it is in adults.
5. If the tubercular disease of the glands is diffuse the prognosis is less favorable than if it is local.
6. Removal of tuberculous glands in children by operation is not dangerous, nor is there danger of local recurrence nor of general tuberculosis if the diseased tissues are thoroughly removed. Radical means should, therefore, be used fearlessly.

Oleum Rusci in Diphtheria.

Tinctura rusci composita is recommended by Schendel in diphtheria, given in half teaspoonful doses every hour during the day, and every two hours during the night. Children under two years received a smaller amount. Nothing else was used; no local application; diet was carefully regulated.

After three or four doses, the general symptoms disappeared; child roused itself from its apathy, and became lively; the gray exudation turned yellowish, some falling off and showing a granulating surface below. The tincture was tried in forty-three cases. Twenty-five were of the slighter form, and recovered after three or four days' illness; of the other eighteen, which were reckoned severe cases, two died, one underwent tracheotomy, and the remaining fifteen got well without complications.—*Berlin. klin. Wochensch.*, No. 6, 1890.

Chloral Hydrate, Ergot, and Nitric Acid in the Treatment of Whooping-cough.

R. Stevenson Thomson, in the *Archives of Pædiatrics*, June, 1890, p. 463, arrives at the following conclusion: None of these drugs is a *specific* for whooping-cough. Ergot is absolutely useless. Nitric acid is of no use as a specific, but its well-known tonic action makes it a useful drug when combined with the other means usually employed to improve the health of children suffering from whooping-cough. Chloral hydrate is of considerable service in so far as it mitigates the violence of the paroxysmal cough and diminishes the tendency to convulsions, but it has no influence on the number of paroxysms, nor does it shorten the attack.

Etiology of Infantile Spinal Paralysis.

Charcot (*Rev. mens. des Mal. de l'Enf.*, May, 1890). This disease belongs to the neuro-pathological family, and a neuropathic heredity is frequently traceable in those who suffered with it. The antecedents of the patients will usually reveal nervous affections, including hysteria, epilepsy, or resania. In opposition to this view is the recent statement of Cordier, of Lyons, that he had seen the disease in an epidemic form. In one of Charcot's clinical patients fatigue was an important causative factor, delirium supervening three days after the fatigue, and paralysis of one leg on the day following. There was no period of regression during which the paralysis existed in other parts and then appeared in the leg. For fifteen days after the first accident there was severe pain in the sciatic. Complete loss of all electrical reaction indicated the hopelessness of the case. A second patient was seized with chills without apparent cause, followed, the same evening, by paralysis of the right lower limb. The following night the left leg became paralyzed, and then the arm, though the paralysis in the latter was not pronounced. Retention of urine lasted several days.

Etiology and Treatment of Insomnia in Children.

Simon (*Rev. mens. des Mal de l'Enf.*, May, 1890). The treatment of insomnia will depend upon the age of the child when it is due to digestive trouble. The condition may be the result of too frequent nursing, to improper physical condition of the mother, or to some peculiarity about her milk. With bottle-fed children the insomnia may be traced to the bottle or its contents. Should the insomnia continue after these precautions have been taken, a teaspoonful of lime-water or of Vals water may be given between consecutive nursings,

and as a laxative a teaspoonful of syrup of chicory, or a pinch of magnesia in sweetened water. If insomia is due to premature weaning it will usually disappear if the child is restored to the breast. If weaning has occurred at the proper time the regulation of the diet will go far toward relieving any tendency to insomnia. When insomnia is dependent on indigestion in children two years of age and upward a dose of wine of rhubarb or of wine of pepsin at suitable intervals is indicated. To children five or six years of age give a few drops of the following mixture:

℞.—Tinct. quinquinæ	. . . . .	5.00 grammes.
" rhei	. . . . .	2.00 "
" calumbæ	. . . . .	2.00 "
" nucis vom.	. . . . .	0.50 gramme.

All food should be well cooked, and should be finely divided if there be any suspicion that it will not be well masticated.

Insomnia may be attributable to nervous disorders, which may be divided, in this connection, into several groups. The first group would include cerebral sclerosis, chronic hydrocephalus, cerebral tumors, bony lesions, with abscess of the brain. For insomnia from cerebral sclerosis, bromide of potash may be given until relief is obtained, either with or without the iodide. Should this be unavailing, valerian or chloral may be given, with calomel as a laxative. Similar treatment will be suitable with cerebral tumor, or chronic hydrocephalus, but not with cerebral abscess. The insomnia with the latter condition will continue until the pus is evacuated by suitable trepanation. The second group from which insomnia may result includes acute congestion, incipient meningitis, and cerebral irritation. With acute congestion, one should use mild revulsive agents, and, in addition, quinine, aconite, the bromides, and calomel. With incipient meningitis revulsives are also indicated behind the ear or at the nucha. With cerebral irritation, the bromides and chloral will prove beneficial, the latter being given by the rectum. For insomnia with headache, in growing children and those who droop under the confinement of school, a course of bitter tonics, gymnastics, lukewarm baths, and diminution of the hours of study, should be advised. With the neuralgias and chorea, the insomnia may be antagonized by suitable doses of antipyrine. If a child is hysterical, iron, valerian, asafœtida, and warm baths, should be used the same as if no insomnia existed. With epilepsy, if the bromides are ineffectual, strychnine and belladonna should be tried. With all the foregoing conditions galvanization of the head will prove most beneficial in adults, but from the anatomical peculiarities of the case, if it is used in children, the current must be very weak, and not employed more than half a minute at a time. Static electricity is not open to the same objection, and gives admirable results if the insomnia proceeds from chorea, hysteria, headache, gastro-intestinal disorder, or disturbed mental balance. When insomnia is due to pain, as in Pott's disease, coxalgia, white swelling, etc., large doses of quinine will sometimes afford relief. If due to the fevers, opiates must be given, but very gradually, for their depressant action must be remembered, and also the fact that they lock up the secretions. With influenza, quinine or antipyrine will relieve insomnia, and with the rheumatic diathesis the same drugs with the addition of salicylate of soda.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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Dengue in Europe.

To one who believes in evolution as a law of the Universe, there is something very suggestive in the contemplation of diseases so closely resembling one another in their phenomena as to be distinguished with difficulty, yet essentially distinct, being never interchanged, and, if belonging to the non-recurring contagia, not mutually protective.

Such are variola and varicella, measles and Rötheln, and such it would seem are influenza and dengue. The latter might almost be taken for a greatly intensified form of the former in its neurotic type, determined by conditions of climate, etc., had not the two diseases visited several countries last year in succession—dengue during the summer, and influenza during the winter following.

Dengue has been observed in every climate and at all seasons, though showing in temperate climates a preference for the summer months, as influenza does for the winter; and perhaps the comparative absence of pulmonary complications, to which, as we have seen the high mortality which attends the latter is most wholly due, is to be thus accounted for; what deaths do follow dengue depending rather on the disturbance of the nervous centres, and consequent on asthenia, hyperpyrexia, cerebral congestion, with convulsions or coma, irrepressible vomiting of a neurotic character, or rarely epistaxis.

In that class of diseases which Hirsch calls communicable miasms, but which we would rather term *extra-corporeal contagia*, we have seen, during the present century, yellow fever slowly and cholera more rapidly tending to acquire an endemic character or permanent localization in fresh areas, and under climatic conditions less specialized than those of the countries to which they were previously limited. It would appear as if dengue must be included in the list of those which are gradually becoming naturalized between wider latitudes. It had visited Spain, and perhaps other parts of the Mediterranean shores, on a few occasions in the last century, but it had not established itself north of the 30th parallel of latitude until about forty-five years ago, although then, as in 1825, the epidemic, which originated in India had extended itself westward throughout tropical Africa, the West Indies, and the entire littoral of the Gulf of Mexico. In 1845, however, it took up its home in Egypt, spreading in the course of ten years over the whole of Northern Africa; thenceforth its progress was slow, creeping along the Syrian coast and confining itself to the seaport towns it had not gone further north than Alexandretta and the Island of Cyprus until last year. But in June, 1889, it appeared almost simultaneously at Beyrout, Jaffa, and other places, spreading with a rapidity equal to that previously seen only in Hindustan. By the end of August, at Beyrout 20,000 persons, in a summer population of 100,000, had been attacked; in Smyrna 150,000 out of 200,000,

and at Jaffa scarce anyone escaped. Constantinople was reached a few days after its appearance at Smyrna, and Salonika a week or so later. No longer limited to the seaboard, it extended over the whole of Asia Minor and the Lebanon, even at elevations of 4000 to 5000 feet above the sea, and involved all the islands of the Archipelago except Crete. Late in the summer it reached Athens, but this was its extreme westward limit, the Morea and the Adriatic escaping. Dr. de Brun, however, believes that having now, so to say, broken its former bounds, it will probably, whether after an interval of quiescence or not, ere long invade Italy and the south of Europe generally, adding one more to the list of epidemic diseases with which we are already familiar.

Cholera at Peterhof.

Dr. Dobroslawin contributes to the *Archiv f. Hyg.* an interesting report on cholera at Peterhof, illustrating in a striking manner the influence of a fall in the ground-water in determining the incidence of cholera. Not that Pettenkofer himself assigns to variations in the level of the ground-water the character of a *vera causa*, but he holds that these coöperate with the pollution of the soil in infecting the air of dwellings, etc.

Of the arrangements for the disposal of excreta Dr. Dobroslawin unfortunately tells us nothing, but the important point in the history of Peterhof is the absence of wells which could be the sources of infection.

The town consists of a long line of houses running northeast and southwest on a terrace sixty feet above the sea; to the north is a cliff descending abruptly to a lower terrace scarcely above the sea-level, while to the south the land rises rapidly to a range of hills distant eight, ten, or twelve kilometres. The soil is gravel overlying a dense blue clay, the depth of the gravel being nowhere more than three feet, and often less. There are no wells, but the water-supply, abundant and pure, is brought from the Zaborod and Gliadin springs in the hills referred to, a further supply having been added since the time of Peter the Great, from Lapir sixty-four metres higher than the other springs; the distance of these being twenty kilometres and of Lapir twenty-two and one-half.

The combined supply is discharged into a series of pools, one below the other along the southern side of the town, and delivered under pressure to the houses and to the fountains and cascades on the lower terrace, which are the pride of the place. Though so near to, and in constant communication with St. Petersburg, it has, except in 1848 and 1854, enjoyed complete or almost complete immunity from cholera. In 1831 and 1832 it escaped entirely; in 1848 there were 167 cases, equal to 2.16 of the population, besides 58 cases occurring among the visitors. In 1854 there were 146 cases, of which 128 were visitors. In subsequent epidemics the numbers were, in St. Petersburg and Peterhof respectively, (1866) 18,655 and 3, (1870) 1785 and 0, (1871) 7158 and 1, (1872) 4871 and 1. Now the ground water, though close beneath the surface, maintains a constant level, and analyses prove that it is derived from the above-mentioned artificial pools or reservoirs, being very hard, while that of the nearest natural lake is unusually soft. But on the two occasions when only cholera gained a footing, the ground-water was lowered—in fact, was almost entirely drawn off; for in

1837 the conduit between Lapir and the Zaborod and Gliadin springs, which brings the larger proportion of the supply, became the property of a private landed owner, who for twenty years maintained a series of actions for the enforcement of his extortionate demands on the authorities of the town. Several times he threatened to cut off the supply, and actually did so in May, 1848 and 1854, necessitating the closure of the fountains, and of a carriage or sledge factory in which water-power was used. On the latter occasion, in the midst of the excitement, the tyrannical and litigious old gentleman died, to the great relief of the townspeople and the subsequent exemption of the place from cholera.

The immunity enjoyed by Lyons and some towns, the sanitary conditions of which are in no way better than those of others that have suffered severely, is connected by Pettenkofer with the constant level maintained by the ground-water; and whatever other factors may coexist, the experience of Peterhof cannot be explained as a mere coincidence.

P. S.—We would not be misunderstood; for movements of the ground-water and other local or meteorological conditions can only act as contributory causes, favoring the action of the essential causes either directly or indirectly, as by removing any inhibitory factors. It is well known that with pervious sewers transudation takes place inward or outward according as the relative pressure exerted on their walls by the ground-water or the sewage is the greater, and they thus either drain or pollute the subsoil. Movements of the ground-water play an important part in towns with pervious sewers, drains or cesspits, and wells, but if the former were absolutely impervious they would have little influence, and when the water-supply is laid on by pipes from distant reservoirs they cease to have any.

So at Peterhof, on each occasion of the approach of cholera, persons suffering from the disease, in a pronounced or an unrecognized form, there can be no doubt discharged their excreta into pervious cesspits, but so long as the water in the pools and in the sandy soil was high and moving from the former toward the sea, exosmosis from the cesspits and contamination of the reservoirs were prevented; but when the soil was dry and the level of the water in the pools had sunk below the line of junction of the surrounding gravel and clay, the fluid from the cesspits would find its way by percolation into the reservoirs.

Corrigendum.—The name of Dr. Frank should be substituted for that of Dr. Coleman in the July issue of the JOURNAL, page 10, fifth line from the bottom.

Note to Contributors.—All communications intended for insertion in the Original Department of this Journal are only received with the distinct understanding that they are contributed *exclusively* to this Journal for publication. Gentlemen favoring us with their communications are considered to be bound in honor to a strict observance of this understanding.

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